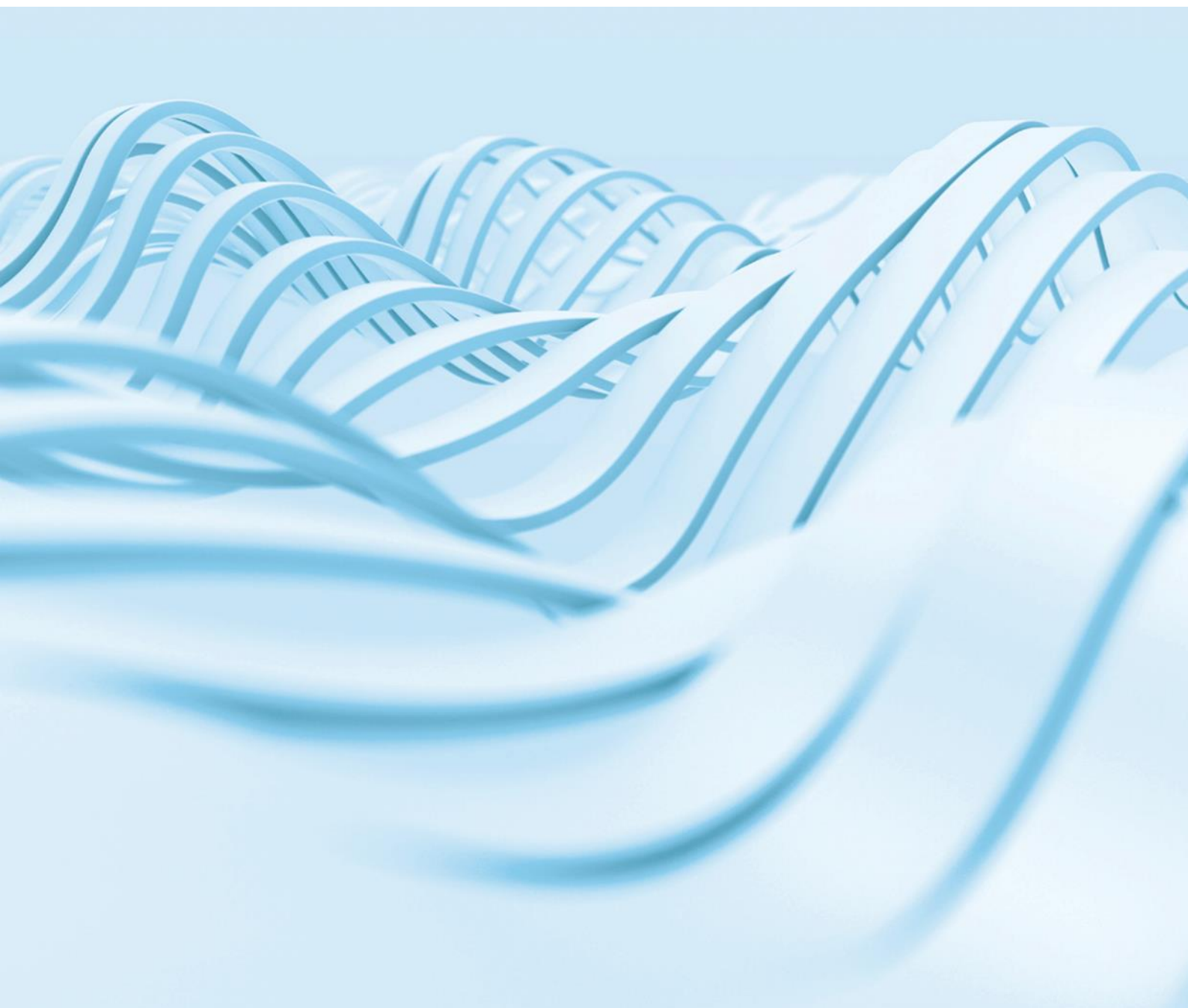




5-year Productivity Inquiry: Advancing Prosperity

Inquiry report – *volume 1*



The Productivity Commission acknowledges the Traditional Owners of Country throughout Australia and their continuing connection to land, waters and community. We pay our respects to their Cultures, Country and Elders past and present.

The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Further information on the Productivity Commission can be obtained from the Commission's website (www.pc.gov.au).

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ISSN 1447-1337 (online)

ISSN 1447-1329 (print)

ISBN 978-1-74037-759-1 (set)

ISBN 978-1-74037-760-7 (volume 1)

An appropriate reference for this publication is:

Productivity Commission 2023, *5-year Productivity Inquiry: Advancing Prosperity*, Vol. 1, Inquiry Report no. 100, Canberra

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7 February 2023

The Hon Dr Jim Chalmers MP
Treasurer
Parliament House
CANBERRA ACT 2600

Dear Treasurer

In accordance with section 11 of the *Productivity Commission Act 1998*, we have pleasure in submitting to you **Advancing Prosperity**, the Commission's final report for the 5-year Productivity Inquiry.

Yours sincerely,

Handwritten signature of Michael Brennan in black ink.

Michael Brennan
Chair

Handwritten signature of Alex Robson in black ink.

Alex Robson
Deputy Chair

Handwritten signature of Lisa Gropp in black ink.

Lisa Gropp
Commissioner

Handwritten signature of Stephen King in black ink.

Stephen King
Commissioner

Terms of reference

I, Josh Frydenberg, Treasurer, pursuant to parts 2 and 3 of the *Productivity Commission Act 1998*, hereby request that the Productivity Commission undertake an inquiry into the Australia's productivity performance and provide recommendations on productivity-enhancing reform. This inquiry is the second of a regular series, undertaken at five-yearly intervals, to provide an overarching analysis of where Australia stands in terms of its productivity performance. The first report, *Shifting the Dial* was completed in 2017.

Background

Australia's economy has performed strongly in recent decades enjoying robust growth in incomes and living standards following 28 years of consecutive economic growth interrupted by the COVID-19 pandemic. Australia's economic recovery from the pandemic has been world leading however to ensure Australians continue to enjoy higher living standards, we need to continue to focus on the task of lifting productivity.

Productivity growth is vital for Australia's future, particularly as the Australian and global economies emerge and begin to recover from the economic impacts of COVID-19. The 2021 Intergenerational Report makes it clear that future growth in income and living standards will be driven from productivity growth as the participation effects of young migration are offset by an ageing population. Global and domestic productivity growth in recent decades however has slowed. Changes brought about by the COVID-19 pandemic and the global and domestic policy responses will also provide a unique historical context for this Review.

Given the scale and nature of the economic shock caused by the COVID-19 pandemic, it is expected to have an enduring impact on Australia's productivity challenge. The acceleration in the uptake of technology by business and individuals has stimulated growth in remote work, online commerce, businesses' digital presence and innovative delivery of public services like health and education. The pandemic has affected business models in some key sectors and underscored the need for labour mobility across the economy.

In this environment, Australia needs policy settings that foster a flexible and dynamic economy, that is able to adapt in the face of economic challenges and opportunities. Policy settings should encourage the economy to adapt to the growing importance of digital technologies, including through developing a skilled labour force. They must also be forward looking and support an environment that promotes economic dynamism, entrepreneurship and appropriate risk-taking, and innovation and technological adoption.

Against this background, the Review can play a critical role in making high-value and implementable recommendations to support Australia's productivity growth. Lifting Australia's productivity growth will involve a combination of economy-wide and structural reforms, in addition to targeted policies in particular sectors to push Australian industries closer to the global frontier.

Scope of the inquiry

The Commission is to review Australia's productivity performance and recommend an actionable roadmap to assist governments to make productivity-enhancing reforms. Each recommendation should qualitatively and

quantitatively estimate the benefit of making the reform and identify an owner for the action and a timeframe in which it might occur.

Without limiting related matters on which the Commission may report, its report to the Government should:

1. Analyse Australia's productivity performance in both the market and non-market sectors, including an assessment of the settings for productive investment in human and physical capital and how they can be improved to lift productivity.
2. Identify forces shaping Australia's productivity challenge as a result of the COVID-19 pandemic and policy response.
3. Consider the opportunities created for improvements in productivity as a result of Australia's COVID-19 experience, especially through changes in Australia's labour markets, delivery of services (including retail, health and education) and digital adoption.
4. Identify priority sectors for reform (including but not limited to data and digital innovation and workforce skills) and benchmark Australian priority sectors against international comparators to quantify the required improvement.
5. Examine the factors that may have affected productivity growth, including domestic and global factors and an assessment of the impact of major policy changes, if relevant.
6. Prioritise and quantify the benefit of potential policy changes to improve Australian economic performance and the wellbeing of Australians by supporting greater productivity growth to set out a roadmap for reform.
7. Revisit key recommendations and themes from the previous five yearly review in light of the above, where relevant.

The Commission should have regard to other current or recent reviews commissioned by Australian governments relating to Australia's productivity performance and include comparisons of Australia's productivity performance with other comparable countries. The Commission should support analysis with modelling where possible and qualitative analysis where data is not available, and this is appropriate.

Process

The Commission should consult widely and undertake appropriate public consultation processes, inviting public submissions. The Commission should actively engage with Commonwealth, and state and territory governments. The final report should be provided to the Government within 12 months of receipt of these terms of reference.

The Hon Josh Frydenberg MP
Treasurer

[Received 7 February 2022]

Acknowledgements

The Commission acknowledges and thanks the following Commissioners and staff who have worked on the Inquiry:

Michael Brennan
Alex Robson
Lisa Gropp
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The Commission’s report is divided into 9 volumes: an overview document (volume 1) that presents our policy agenda, and inquiry content volumes (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda, including a modelling appendix. The full report is available from www.pc.gov.au.

Foreword

There has been a vast improvement in average human well-being over the last 200 years: measured in longer lives, diseases cured, improved mobility, safer jobs, instant communications and countless improvements to comfort, leisure and convenience.

Will our living standards continue to improve at the same rate they did in the past?

We measure and aggregate those improvements into a single number — the rise in GDP per hour worked across the economy. It is an imperfect measure but has enormous value if we interpret it carefully. One important message is that the average rate of productivity growth in Australia has slowed in the last 20 years, as it has in much of the developed world.

But it is also important to move beyond thinking about productivity growth in terms of a single number — an economy-wide percentage growth rate. In fact, there has always been great variability in productivity performance across the economy. Some sectors have seen huge technological transformation and innovation, with bursts of rapid productivity growth — with products becoming radically cheaper and better, and a steady flow of new offerings. Other sectors, not so much.

Globally, agriculture, manufacturing, mining, energy, transport and communications have seen this sort of transformation. Other sectors, including many service industries, have not.

It turns out that this variation really matters.

When productivity growth in different sectors consistently diverges, then (perhaps counter-intuitively) the sectors with high productivity growth tend to shrink as a share of the economy while low productivity sectors grow. It is as though we collectively spend more effort (resources) on what is hard but necessary, and less on that which is getting easier. But if maintained, this pattern can lead to an ever-growing share of low productivity sectors — an ever-growing drag on overall future productivity growth. This is known as ‘cost disease’.

This has a big implication: productivity policy has to focus on the areas that have proven *hardest*, not those areas where past progress has been most readily achieved. As US economist Ben Jones put it:

GDP and future progress depend less and less on the sectors we have found relatively easy to advance ... and increasingly on the sectors that continue to be hard, which make up a growing share of the economy.¹

In many ways, that is the key theme of this report — how we might adjust productivity policy to focus more on the hard areas.

Productivity improvement in services is hard. Services tend to be labour intensive, many are delivered in person, often bespoke and hence not amenable to mass production. They can be hard to automate. But they have grown to make up 80% of the economy and 90% of the workforce. Future productivity growth in Australia relies crucially on getting better productivity across the services sector. In Australia, services sector productivity has lagged that of the goods sector. Government services, in particular, have seen very low productivity growth. Our performance relative to other economies is typically weaker in services than in goods.

¹ Jones, B.G. 2022, ‘Where innovation happens, and where it does not’ in Andrews et al. (eds.), *The Role of Innovation and Entrepreneurship in Economic Growth*, NBER.

Having **highly skilled and adaptive workers** will be critical to address this challenge. A skilled and flexible workforce is a broad enabler — it militates in favour of *balanced* growth across all sectors of the economy, including in the hard areas. If we get policy right — in education, skilled migration and labour market regulation — this could be Australia's most significant and enduring source of comparative advantage.

Education is a critical area of focus. First, because it represents perhaps the greatest and most enduring general-purpose technology known to humankind — the ability to transfer knowledge in a concentrated form; and to build in people a general capability for future learning. As human strength and speed, and routine tasks in general, have been replaced by technology, the focus of jobs shifts towards higher order skills. A highly skilled workforce is necessary to use technology, and to add more value in the distinctly human areas that technology cannot replace.

Second, education is one of those government services that has itself seen very low productivity growth. We have achieved huge gains in economy-wide productivity by adding additional *years* of education. There is some scope for this to continue but, overwhelmingly, future gains will have to come from higher *quality* education from the resources (including years of student time) we put into it. That means productivity.

We also need to re-think the emphasis of **innovation policy**. Existing policy instruments reflect traditional channels of innovation — tax incentives for research and development, patent protections for new inventions, commercialisation of new ideas. These remain important but are only a small part of the innovation story. They (again) provide a continued path for those sectors where innovation and advance have been most readily achieved in the past. The bigger story is where innovation has not happened, or has happened differently.

Some 98% of Australian businesses do not produce new-to-the-world innovations. They are adopters, adapters, incremental improvers. For productivity, they are the main game. Supporting them to take up new technology or adopt a business innovation could have profound and broad productivity benefits. But facilitating the flow of ideas is hard. There are fewer existing policy levers that have broad application. The role for government has to be thought through. The combination of many small things, on multiple fronts, is likely to be the optimal policy mix.

The adoption of **digital technology**, artificial intelligence and data use by business is a key example. These are vital enablers of productivity — perhaps even more so in services industries where they can augment human input and, in some cases, generate scale. Government actions in improving data availability, promoting regtech, and facilitating secure use of technology all create an environment for increased uptake by business.

Stepping back, the most effective diffuser of ideas is a **dynamic economy**, in which knowledge spreads through competition, labour mobility, and trade and investment links. Some indicators suggest the Australian economy has become less dynamic in the last two decades. But the solutions are complex. Broad policy enablers like tax and land use regulation play an important role in fostering business entry, competition and investment. In many areas (such as insolvency law or access to finance) progress is already being made. In other areas it is important for policy makers to tread carefully to avoid unintended harms.

The **non-market economy** — mainly government services — is different in many respects. Prices, competition and entry and exit are less salient (if at all).

Innovation can be more limited in the non-market economy. Moreover, it has proven hard to spread those innovations that do arise — sometimes because of regulations, sometimes funding models, and often culture. In many cases, the innovation eco-system is lacking, and needs to be developed from the ground up. The creation of the Australian Education Research Organisation is a standout example of new 'infrastructure' to support innovation and the use of evidence across the school system.

If we are to focus attention on the hard areas, then there are none harder than the non-market economy. Productivity growth in this sector could look different — perhaps it will manifest more in better *quality* services than in *cheaper* ones. But in the absence of productivity growth, the ‘cost disease’ will worsen and spread. Government services will expand as a share of the economy, requiring ever faster productivity growth elsewhere to ‘fund’ it.

The productivity challenge comes into stark relief in respect of **climate policy**. Decarbonising the economy in the next three decades will be a huge transformation. The difference between doing it efficiently and doing it poorly will be a major determinant of the living standards of all Australians. It is a productivity challenge — how to harness investment, innovation and shape incentives to reduce cost (albeit a cost we do not currently count in GDP or business profits).

Reflecting these priorities, this report, complemented by its other volumes, is organised around five key reform pillars:

1. **Building an adaptable workforce** to supply the skilled workers for Australia’s future economy, through education reform, skilled migration and modern, fit-for-purpose labour market regulations.
2. **Harnessing data, digital technology and diffusion** to capture the dividend of new ideas, focused particularly on the adoption of ideas by the 98% of businesses who are not cutting-edge innovators.
3. **Creating a more dynamic economy** through fostering competition, efficiency and contestability in markets, through a range of levers — from competition policy and sector specific regulation to broad enablers of business entry and investment.
4. **Lifting productivity in the non-market sector** to deliver high quality services at the lowest cost, by changing incentives and culture.
5. **Securing net-zero at least cost** to limit the productivity impact caused by climate change, including by fostering efficient adaptation to a changing climate.

Across these areas, there are 29 reform directives and 71 specific recommendations. Some are significant policy changes with a potentially large individual impact. Others are a collection of smaller changes that collectively contribute to the goal of supporting productivity growth, particularly in hard-to-reach areas. Some recommendations deal with a single decision, while others set out a direction for ongoing change, requiring multiple steps.

This work builds on the *Shifting the Dial* report from 2017. That report refocused the reform conversation, highlighting the importance of cities, data policy, the working of the Federation and health policy. The themes from *Shifting the Dial*, and the recommendations from that report are, if anything, increasingly relevant following COVID-19 disruptions, and Australia’s data and digital progression.

As the second 5-yearly review into productivity, this report is a product of its policy and macro-economic context. These include the lasting impacts of the COVID pandemic, a very different macro-economy to five years ago, new fiscal pressures and a clearer policy commitment to decarbonising the economy.

One additional piece of context is the changing global order. A combination of war, inflation, strategic tension, new concerns about supply chain resilience and an escalation of production subsidies and local content rules by large economies like the United States create a different — and fast-changing — backdrop for Australian policy. It is a challenge for productivity, which was aided by increased global trade and investment flows in the decades following the Second World War.

Australia can navigate these challenges, but should do so with a clear-eyed view of our distinct economic structure and comparative advantages. Openness could look different, but it will be just as important.

A final point concerns uncertainty. We can never predict future rates of productivity growth nor its precise sources: we cannot know what technological changes or innovations will transform which industries. Policy is not about accurate prediction, so much as positioning. There are big technological opportunities out there now — which can make a greater contribution in many parts of our economy. More discoveries will come, and we need to be fast and efficient adopters (and adapters) of them.

No policy exists that can mechanically lift productivity by a specified amount. We cannot dictate future growth. But we can stack the odds in our favour.

A user's guide to the productivity inquiry report

A cohesive suite of policy reforms to reinvigorate Australia's productivity growth is presented.

The report is split into two parts: an *overview document* (volume 1) that presents our policy agenda, and *inquiry content volumes* (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda. These inquiry content volumes include background research and analysis, and a modelling appendix, which outlines the results from an economy-wide model that was used to contextualise and better understand the distributional consequences of parts of the policy agenda.

Overview volume

Volume 1, Advancing Prosperity contains:

1. A narrative overview that provides the economic context for this inquiry, outlines the barriers to future productivity growth, sets out a policy agenda to overcome these barriers, and paints a picture about what the future could look like following reform implementation.
2. A roadmap that indicates to government which reform directives should be most highly prioritised. The roadmap also contains one-page summaries of the details necessary for implementation of the highest priority reform directives.
3. The set of recommendations from across the report, aggregated into reform directives that are organised by broad policy theme. There are 29 reform directives made up of 71 separate recommendations.

Inquiry content volumes

Volume 2, Keys to growth — discusses productivity as the key to Australia's ongoing growth and prosperity, highlighting particular **headwinds and challenges** facing Australia's productivity growth.

Volume 3, A competitive, dynamic and sustainable future — recognises that much of the productivity improvement will be determined by decisions of businesses and so the **institutional, regulatory and tax environments** in which businesses operate need to be conducive to productivity-enhancing changes. Governments can influence this environment through changes to policy settings for competition, trade and investment activity.

Volume 4, Australia's data and digital dividend — examines opportunities for Australia to get more value out of its **data** holdings by enhancing its secure use in developing innovative new products and services, and improving the productivity of service delivery. Enabling Australia's communities —

A user's guide to the productivity inquiry report

particularly in regional and remote areas — to benefit from **digital** tools and approaches, and supporting businesses to be **cyber safe**, will be key to ongoing digital progression.

Volume 5, Innovation for the 98% — details the underappreciated importance of the diffusion of innovative approaches and ideas throughout the economy. Options to encourage more **diffusion of innovations** are canvassed, including greater use of collaboration and networks to catalyse diffusion and foster spillovers in the private sector, and new funding and procurement models for diffusion in publicly funded and delivered services.

Volume 6, Managing the climate transition — provides a path for Australia to respond to its **climate change challenges** at least cost for the economy and productivity. Reform of the safeguard mechanism for Australia's largest greenhouse gas emitters is discussed as a way of helping Australia to transition towards a less costly and potentially more equitable response to climate change. Options for an efficient climate adaptation strategy are also outlined, focussed on information provision, and policy settings that support adaptation decisions and development pathways.

Volume 7, A more productive labour market — examines the settings in Australia's **labour markets** that will be necessary to support renewed productivity growth. We detail reform options in skilled migration, occupational licensing and workplace relations, including in relation to platform-based work.

Volume 8, From learning to growth — recognises the importance that quality **education and training** systems have for the skills and adaptability of our workforce. Innovation and its diffusion in schools is considered, in the context of making best practice in teaching, use of technology and school operation widespread. Improving the quality of tertiary education (both universities and vocational education and training) and options to support increased completion rates are considered.

Volume 9, Whole-of-economy modelling — describes the results of an **economy-wide model** used in the inquiry to contextualise how the benefits of a stylised representation of certain reforms would accrue and better understand some of the distributional impacts of these reforms. In particular, results were estimated for aggregate measures such as incomes, prices, wages and GDP; the differential impacts across various groups (delineated by age, gender and education); and measures of consumer wellbeing and income inequality.

Where the results from the model were helpful in contextualisation, they have been discussed in the relevant supporting volume with an appendix to the volume summarising the key results.

1. An agenda to lift Australia's productivity

1.1 Australia faces a productivity predicament

Productivity growth is the key to long-term prosperity.

It is the process by which people get more from less: more and better products to meet human needs produced with fewer hours of work and fewer resources. In many cases this growth occurs with lighter environmental impact.

Historically, productivity growth has given Australians higher living standards and more leisure time — compared with Federation, the average Australian full-time employee now works 14 fewer hours per week, while real wages have increased more than six-fold.

But Australia, along with most other advanced economies, is facing a productivity predicament: a seemingly entrenched slowdown in the rate of productivity growth.²

Over the decade to 2020, average annual labour productivity growth in Australia was the slowest in 60 years, falling to just 1.1% compared with 1.8% over the 60 years to 2019-20 (figure 1.1).

This seemingly small difference — just 0.7 percentage points — has an outsized effect on the long-term future prosperity of Australians. It means that the economic pie, and accordingly the welfare of Australians, will be smaller than it might otherwise be. For example, the time it takes for economic output per person to double increases by 25 years — approximately the length of a generation — from about 39 to 64 years. So Australians would have to work relatively more hours to afford fewer goods and services than would otherwise be the case; it means the rate at which higher quality goods and services and wholly new products are introduced will be slower, and their prices higher than otherwise.

The Australian Government has officially acknowledged this productivity slowdown, reducing the productivity assumption underlying its annual economic forecasts from 1.5% to 1.2%. This seemingly trivial downgrade implies that, on average, the income of Australians in 40 years are projected to be almost 20% lower than they would otherwise be. And compared with the average over the past 60 years (1.8%), 1.2% productivity growth implies that the increase in projected future incomes will be close to 40% lower and the working week almost 5% longer (see volume 2). And the cumulative sum of year after year of slower productivity growth — the consumption and leisure opportunities lost forever — is significantly larger.

Simply put, entrenched, slow productivity growth leads to a much smaller productivity dividend in the long run (box 1.1). Not only does it take longer to achieve a given level of prosperity, but the cost — in terms of

² Average productivity growth among OECD economies since 2005 was roughly one percentage point per annum below the historical average (see figure 2.3 in volume 2).

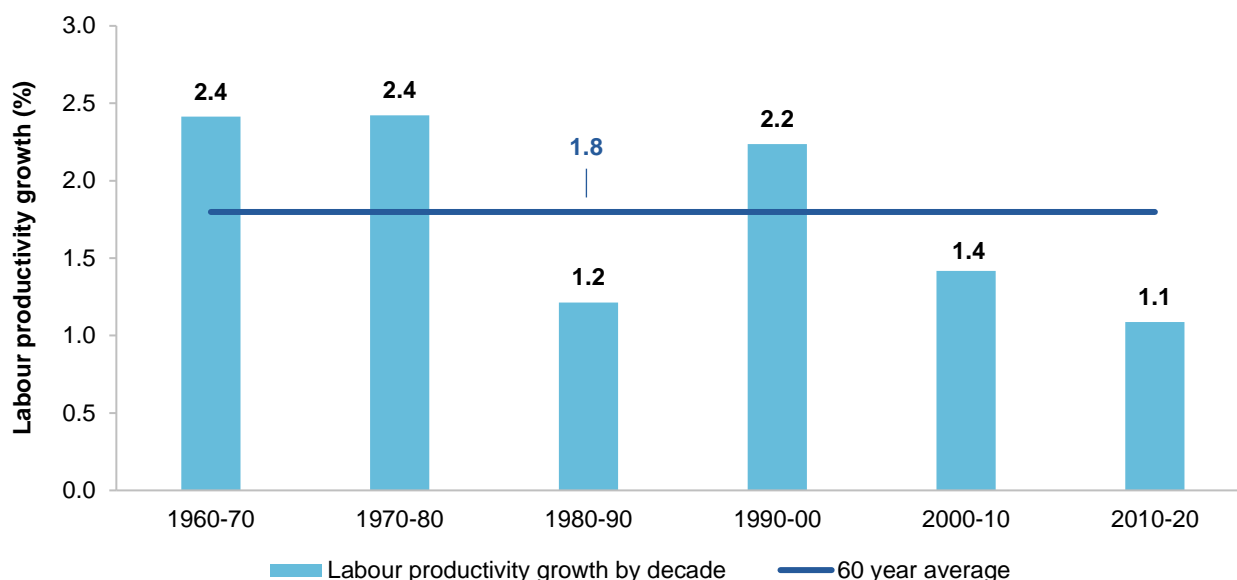
consumption forgone — of swapping out of work and into leisure is also much higher. The often touted ‘4-day week’ is that much harder to achieve.

For society more broadly, there would be comparatively fewer resources available to face emerging challenges, be they decarbonisation or changes in the global order. In other words, those same policy settings that enable productivity growth also help to build a more agile and resilient economy — one better able to resist and adapt to the vagaries of an uncertain world while maintaining the prosperity of Australians.

An effective policy response requires, on the one hand, an understanding by governments of the challenges to growth, and a broad package of initiatives, often coordinated between different levels of government, and covering almost all of their portfolios — there is no single ‘productivity lever’ that government can pull to guarantee growth. And on the other, an understanding that at any point in time, there are emergent opportunities including from new technology. Growth comes from seizing those opportunities as they emerge.

Figure 1.1 – Labour productivity growth is at its slowest in 60 years^a

Average labour productivity by 10 and 60 year periods



a. Labour productivity calculated as GDP per hour worked. GDP data sourced from the ABS between 1959-60 and 2021-22. Hours worked data from Penn World Tables for between 1959-60 and 1973-74 and from the ABS between 1974-75 and 2021-22.

Box 1.1 – The productivity dividend: more consumption and less work

Productivity describes the quantity of products that can be generated (output) from the resources (inputs) used in the production process. Productivity growth occurs when there is a reduction in the amount of inputs required to produce a given level of output. This tends to lower the prices of outputs where productivity growth is strongest. However, often productivity shows up as an improvement in the quality or range of goods and services for given inputs — like better health treatments.

Hence, the growth in living standards experienced over the last 200 years can be seen as manifesting in three main ways: cheaper goods and services; higher quality goods and services; and, entirely new goods and services. In each of these three ways, productivity growth has increased the typical worker’s

Box 1.1 – The productivity dividend: more consumption and less work

purchasing power — a smaller number of hours of work is required to achieve any particular level of living standards.

The decreased hours of work and increased income that result from productivity growth can be thought of as a 'productivity dividend'. One way to illustrate these benefits of productivity growth is to think about the trade-off that it implies for the average worker between hours spent working on the one hand, and consumption possibilities, on the other. Productivity growth leads to higher real wages and lower real prices, which means that the average worker can choose to:

- work the same number of hours and consume more (the whole dividend is used to increase consumption)
- work less and consume the same amount (the whole dividend is used to reduce work)
- some combination of the above including working less and consuming more (the dividend is divided between less work and more consumption).

In practice, Australians have collectively, implicitly, chosen the third option, with most of the gains being in the form of greater consumption with some reduction in aggregate working hours (volume 2).

1.2 There are headwinds to faster productivity growth**Headwinds to faster productivity growth**

The **services sector** — where productivity gains are harder to find — is large and growing



A **changing climate** and **heightened global tensions** shape Australia's productivity predicament



The slowing rate of overall productivity growth is an important context for this report.

But there is another element to the story. The reality of productivity is never reflected in a single, economy-wide growth rate. At any one time, some sectors of the economy experience rapid innovation and technological advance — and hence rapid productivity growth — while others do not.

The erratic path of productivity growth has been propelled by waves of technological and other innovation — often concentrated on specific sectors. Occasionally, general purpose technologies emerge with productivity implications across the whole economy.

When productivity growth across different sectors diverges consistently over a long period, then the sectors achieving profound progress tend to get smaller as their output costs come down. So the low productivity sectors tend to grow as a share of the economy — known as 'cost disease' — a tendency that risks creating an ever-growing drag on overall productivity growth.

A key message of this report, and one of the key determinants of future growth in the Australian economy, will be how we address the need for productivity growth with the increasing dominance of services — by far the largest part of the economy, but where productivity growth has historically proven harder to generate.

The services sector is large and growing

The services sector is large and growing





Non-market services could increasingly weigh on growth



Productivity gains may be hard won, even in market services



A services economy requires a highly skilled workforce

On average over the past 35 years, growth in labour productivity has been higher in the goods sector than in most parts of the services sector. But over this period, the goods sector has been steadily shrinking, while the services sector has been growing (figure 1.2).

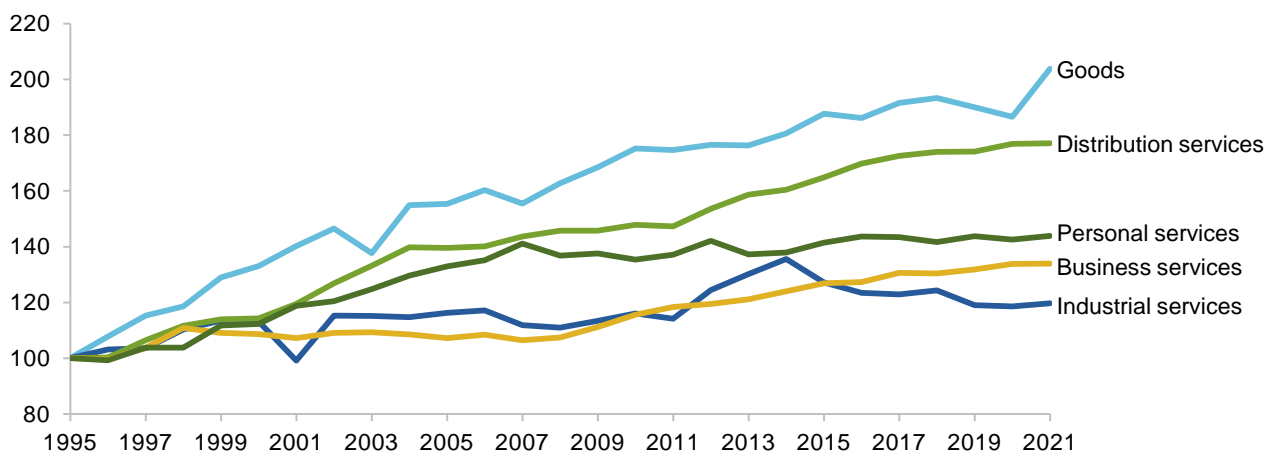
Australia’s services sector now employs almost 9 out of 10 people in the labour force and accounts for about 80% of economic output. Both figures have grown significantly over the past 70 years — from about 50% in 1950.

The expansion in services is neither a peculiar quirk of Australian economic development, nor an accident. It is the result of, amongst other things, cost disease and (perhaps counter-intuitively) growing prosperity, as well as an aging population — traits common to all prosperous economies (box 1.2).

But while an expanding and slow productivity growth services sector increases the headwinds to future productivity growth, this shift is not something the government should attempt to ‘undo’ — such a move would conflict with revealed community preferences and hence be costly and counterproductive.

Rather governments should seek to understand what might be hindering productivity growth in the services sector and, where there is strong evidence for cost-effective intervention, act.

Figure 1.2 – Labour productivity growth in Australia by subsector^{a,b}
Index (1995 = 100) between 1994-95 and 2020-21



a. Industries at the Australian and New Zealand Standard Industrial Classification (ANZSIC) 1 digit level were aggregated into sectors by weighting the growth in labour productivity by the hours share of that industry (in the previous year). b. See volume 2, chapter 2, footnote 17 for definition of services aggregation.

Two key characteristics of Australia's structural shift to services and that present downside risks to aggregate productivity growth are:

- the 'non-market' (defined below) services sector — because it is expanding disproportionately quickly in relation to its rate of productivity growth. It already accounts for over 25% of Australia's economic activity and employment but where measured productivity growth is particularly slow — effectively zero since the turn of the century
- the generally poor relative performance of Australia's services — unlike in the goods sector, Australia's performance in the market service sector is below the average compared with our global peers (see volume 2).

Box 1.2 – Why have services become so dominant?

The expansion in size of the relatively slow productivity growth services sector is the global historical norm. There are five main explanations for the increased share of the services sector in output and employment:

1. **Baumol's 'cost disease'** — If certain sectors have comparatively slow labour productivity growth and consumers are somewhat unresponsive (inelastic) to relative price increases, then the share of this sector in both output and the labour force will tend to increase. This occurs because wages in all industries, including the slow productivity growth sector, tend to grow at a similar pace to prevent an exodus of workers from one sector to another. To fund higher wages, businesses raise their prices and, because consumers are not very responsive to these higher prices, the overall share of the low productivity sector increases in both output and employment.
2. **Income effects** — As incomes grow, consumers tend to spend a larger share of their income on services, causing both the output and employment share of services to rise. Consumption of holidays, house-cleaning, afterschool care, gyms and home delivered food has grown faster than that of TVs, clothing and sports equipment.
3. **Services as an input and inter-industry outsourcing** — Services provided by other businesses are accounting for an increasing share of business costs, even within the goods industry itself. In manufacturing over the past 26 years, expenditure on services provided by businesses in other industries went from 15% of non-capital costs to 21%.^a Reasons for this include: (i) slower productivity growth in the services sector combined with production methods that are unable to substitute away from services, and (ii) outsourcing of functions that were previously done inhouse.
4. **Industrialisation in Asia** — Rapid industrialisation in Asia with a focus on manufacturing exports has caused significant outsourcing of manufacturing roles from the advanced economies to developing Asian economies.
5. **Demographics** — Increasing life expectancy combined with falling fertility rates in advanced economies has meant that their populations have been ageing at a pace that is still a few decades away from its peak. This has increased the demand for several non-market services including health care and aged care.

a. Calculated as the factor share of income divided by 1 minus the capital share (which gives the factor share of non-capital income and is the same as the share of non-capital costs).

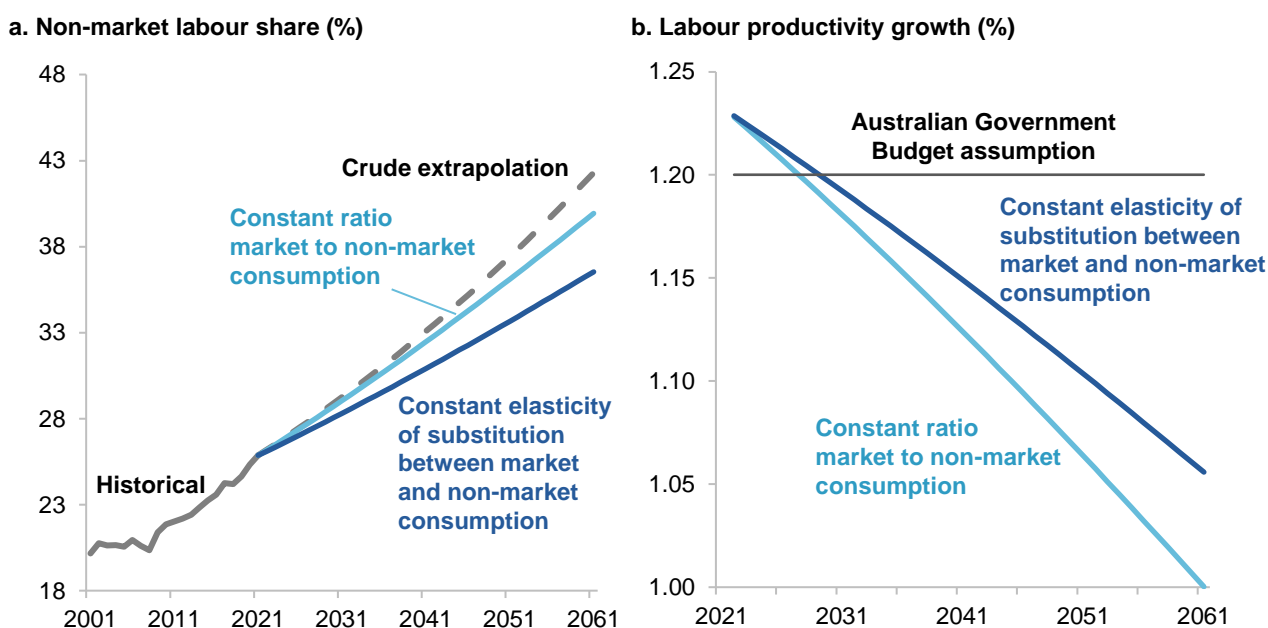
Non-market services could increasingly weigh on growth

Non-market services are those that are typically provided free of charge, or at prices that are well below cost. This is the case because usually the government is the key funder (and often the provider) and regulator of these services. Non-market services include schools, hospitals, childcare and defence services.

Often by design, a degree of competition and cost reflective pricing are absent or less salient than in the market sector. This can affect the channels and processes by which innovation and productivity growth can occur and be transmitted.

The potential effect of low productivity growth in the non-market sector is stark. An extrapolation of past trends out to 2060-61 illustrates the scale of the challenge. If productivity growth in the non-market sector continued at its historic level, then (under the simplest assumptions) in 40 years that sector would account for more than 40% of employment (figure 1.3).³ Under more nuanced assumptions, the non-market sector would still increase materially as a share of the labour force.⁴

Figure 1.3 – Projected growth of the non-market share and aggregate labour productivity^a



a. Productivity Commission modelling (see volume 2 appendix).

This result matters. It means that if productivity growth in an expanding non-market sector remains in line with its measured historical average of zero, it would represent an increasingly large drag on overall economy-wide productivity growth.

This implies that growth in the market sector must *accelerate* well above the rate of overall productivity growth experienced in the Australian economy in the 2010s simply to maintain the overall economy-wide average growth rate over that period (which was 1.1%). Indeed, *even if* market sector productivity grows at the higher rates of growth observed in that sector during the 1990s, it is unlikely Australia would reach 1.2% average labour productivity growth (figure 1.3). As such, improving productivity in the non-market sector is a high priority if Australia is to even maintain historical rates of economic growth.

³ 2060-61 is the projection period for the most recent Australian Government Intergenerational Report.

⁴ Three scenarios were considered: (i) consumers and governments purchase a constant real ratio of non-market to market goods (that is, governments and consumers treat market and non-market goods as perfect complements; (ii) consumers and governments try to maintain a constant share of total expenditure on non-market goods irrespective of price; (iii) consumers and governments will adjust their consumption of non-market services to price by a fixed proportion (constant elasticity of substitution). In all scenarios, market and non-market sector labour productivity is fixed (equal to their 2-decade growth averages — these numbers are arbitrary for the purposes of this projection).

It is important to note that the non-market sector does suffer from measurement issues, and in particular, it is likely that quality improvements in, for example, health care and education, are under counted (see volume 2). But even accounting for these quality improvements, it is likely that non-market productivity growth as a whole lags the market sector. Indeed, experimental ABS estimates for labour and multifactor productivity in schools, hospitals and higher education have yielded similarly (to the National Accounts) low and slow estimates for the rate of productivity growth. In addition, non-market services that are government funded and require additional tax revenue to fund their expansion, place an increasing burden on the economy.

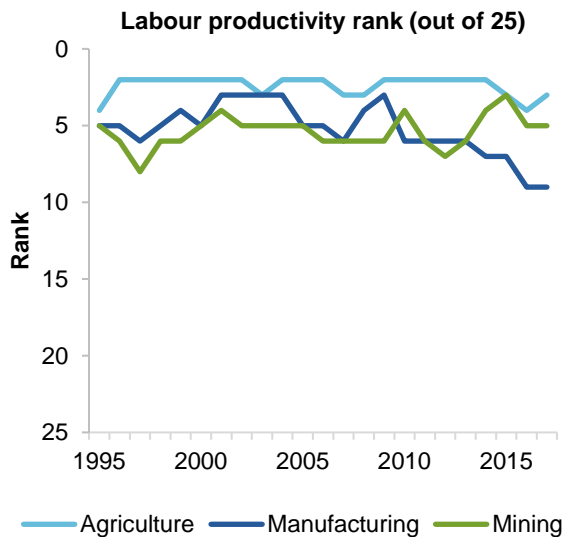
Productivity gains in services could be harder won

The goods sector will continue to be an important driver of productivity growth in the future, led by Australia's mining and agricultural sectors, which are some of the most productive in the world (figure 1.4). In these industries, physical capital often replaced labour in the production process (new machinery on the production line) and scientific advances significantly expanded physical output (fertiliser or new crop types in agriculture).

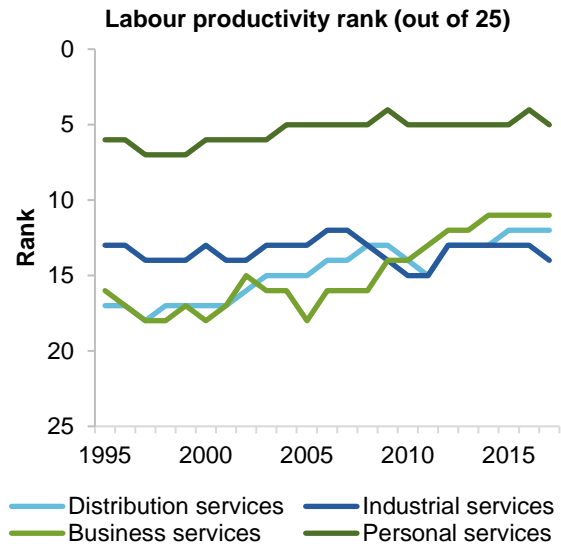
To some extent these forces operate in service industries too. Technology can replace people for some tasks (such as the use of Artificial Intelligence (AI) in banking and formerly ATMs), reducing the overall cost of a service. Digital communications can provide scale (say in university education) allowing for expansion of services at low marginal cost.

Figure 1.4 – Australian mining and agriculture have very high productivity^{a,b}

a. Goods sub-sectors



b. Services sub-sectors



a. Distribution services are transport and postal, IT and telecommunications and retail and whole trade; industrial services are construction and utilities; personal services are food and accommodation and arts and recreation; and professional services are professional, scientific and technical services, real estate, finance and administration and support services. b. See notes c and d in figure 2.7 of volume 2.

And indeed, although we think of them as distinct, the service sector is closely linked to the goods sector. In many cases, service sector productivity growth will occur because of new and improved *physical* products (goods) that are used to deliver a service. Many goods are valuable because of their capacity to deliver higher quality or lower cost services — modern coffee machines can allow access to a wider variety of barista services, for example. In addition, many goods are differentiated based on their attached wraparound

services, rather than solely the physical characteristics of the good itself — think of Apple hardware, that is largely generic but aesthetically pleasing, and its bundled proprietary software.⁵

But in many cases, productivity gains in services — particularly non-market services — take the form of quality improvements and greater variety of novel products more so than real cost reductions. Recent history has borne this out:

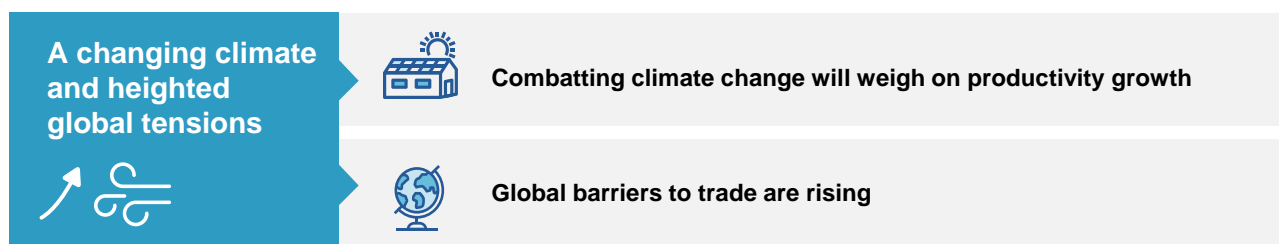
- The productivity improvements of expanding health, education and public administration non-market services are typically realised as improved quality (e.g. a modern doctor is better able to improve patient health outcomes in a single hour than they could in the 1980s).
- Many digital services deliver benefits by improving the quality of the user experience rather than just reducing the inputs required to provide the service (e.g. in the case of Amazon or Netflix, much of the value-add comes through the increased convenience of the online experience).
- The benefits associated with new technologies such as AI, to the extent that they augment as much as replace human labour, could predominately come through better quality service provision rather than reducing the capital and labour cost of the service (though some cost reductions should be possible).

Even where services are integrated with physical products, it is often the service element that proves hard to transform. In health, for instance, considerable innovation has occurred through medical technology — pharmaceuticals, imaging equipment and pathology — with flow-on benefits to service quality; but innovation in the configuration of the service itself — through digital or communications technology — has been slower to emerge.

From a practical perspective, the need to focus on quality is in part, out of necessity. Many services need to be delivered face-to-face and/or are customised, and so there is less scope to automate them or achieve significant economies of scale.

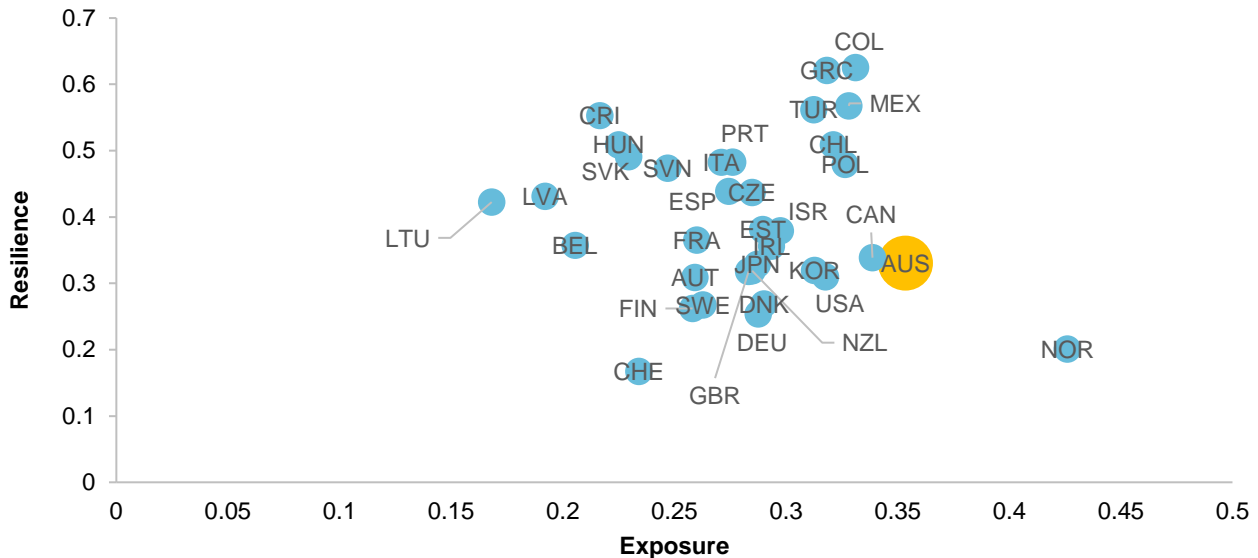
To the extent that future productivity is driven more by improvements in quality and novelty (more so than reductions in cost) than it has been for goods historically, we may need to think differently about how to enable productivity growth going forward.

A changing climate and heightened global tensions



Climate change and the need to decarbonise our economy will shape Australia's productivity performance and weigh on its growth in the short term. By some measures, the threat faced by Australia from climate change may be larger than for other major economies (figure 1.5). The changing climate will directly affect productivity growth in a range of industries, including agriculture, fisheries, and tourism, and be a drag on the productivity of industries that rely on physical labour in heat-exposed environments.

⁵ Standard National Accounting methodologies mismeasure or do not count some of the benefits associated with quality improvements and the introduction of new products, it is difficult to empirically estimate and assign the contribution of those benefits to goods and services respectively.

Figure 1.5 – Australia's comparative preparedness for a low-carbon transition**Economic exposure and resilience to transitional risk in Australia and OECD countries^a**

a. OECD country abbreviations are: Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Chile (CHL), Colombia (COL), Czech Republic (CZE), Denmark (DNK), Estonia (EST), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Hungary (HUN), Iceland (ISL), Ireland (IRL), Israel (ISR), Italy (ITA), Japan (JPN), Korea (KOR), Latvia (LVA), Lithuania (LTU), Luxembourg (LUX), Mexico (MEX), Netherlands (NLD), New Zealand (NZL), Norway (NOR), Poland (POL), Portugal (PRT), Slovak Republic (SVK), Slovenia (SVN), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey (TUR), United Kingdom (GBR) and United States (USA).

Achieving net zero emissions in coming decades will have important implications for *measured* productivity. It requires new capital investment and rapid innovation, in part to replace (rather than add to) existing capital and production processes. Because the cost of carbon emissions has not been reflected in GDP or business profits, abatement efforts could, in many instances, increase the cost of production and could put downward pressure on measured productivity, at least in the short term.

Moreover, productivity measurements can provide misleading indicators of the longer run value of investments in physical and intangible capital if the costs come now and the benefits later. (The mining investment boom was characterised by this — huge investments upfront with productivity improvements that emerged over time.)

Thus, decarbonising the economy could reduce measured productivity growth in ways that reflect the shortcomings of GDP as a measure of wellbeing (environmental impacts, such as through increased carbon emissions, are often poorly measured or not measured at all in economic statistics — see volume 2, chapter 1). But this is not the whole story. Decarbonising will impose real costs over many years, if not pursued via the most efficient path.

The technologies required to get to that goal are not fully developed, and the relative costs of different abatement options are constantly evolving. Governments and businesses cannot simply choose from a stable menu of low-cost options.

The challenge for policy makers is to create broad-based incentives to identify and implement the lowest cost abatement options, with flexibility to adapt to changing technological circumstances. In the absence of a single, explicit carbon price, this means taking a portfolio investment approach based on transparent assumptions about the implicit costs and benefits of existing and future abatement measures (per tonne of CO₂ abated). The higher the cost effectiveness of abatement strategies, the more successful will be Australia's efforts for any given budget.

Meeting the challenge of climate change will require coordination across all levels of Australia's governments, policy settings that encourage wise investments in least-cost abatement and adaptation and multilateral oversight of the abatement contributions of other countries.

Global barriers to trade are rising

The period following the Second World War provided large tailwinds to global productivity growth for many subsequent decades, through the diffusion of new technologies and the expansion of trade, underpinned by a global rules-based order. This has had benefits for small economies like Australia, particularly as we reduced our own barriers to trade, notably in manufactured goods.

Recent global trends — including heightened strategic concerns in our region, war in Europe, COVID-related supply chain disruptions and high global inflation — have stalled the momentum of multilateral trade and investment liberalisation and prompted some reappraisal of supply risks. There has been a shift in policy among key trading partners, including the United States, with a much greater emphasis on supporting domestic production in key sectors (such as semiconductors and green technology) through subsidies and local content rules.

These developments are a challenge to global prosperity. They re-shape the supply chain strategies of local businesses and create policy dilemmas for governments around the world, including Australia. Nonetheless, we are arguably well positioned to navigate them. Policy transparency and a clear sense of our comparative advantages will be key to managing this evolving global order.

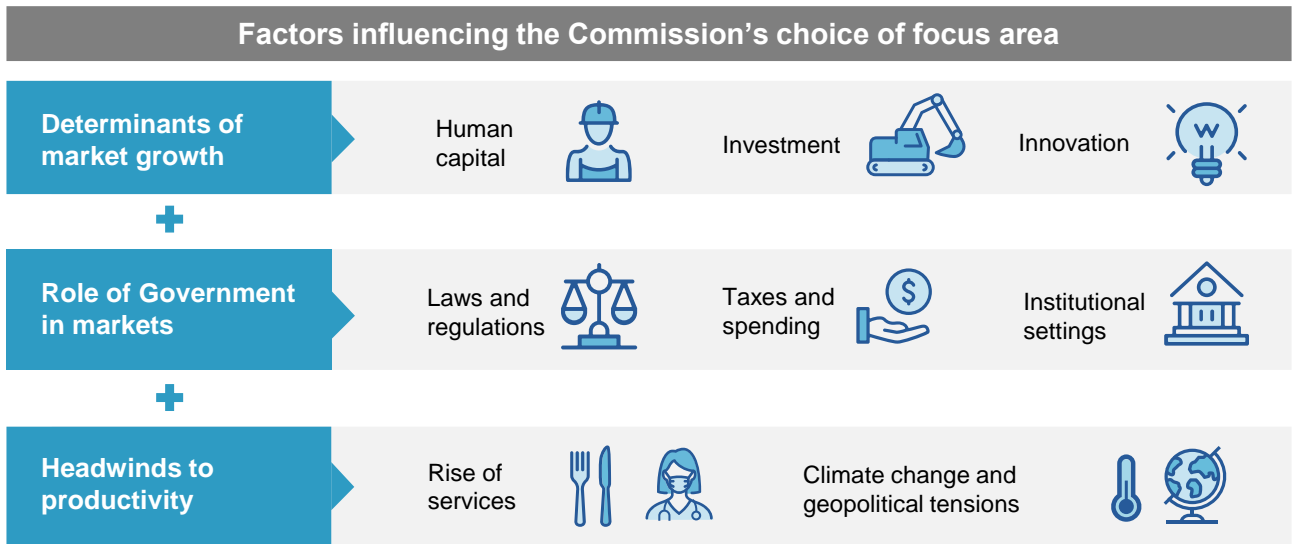
More generally, there are strong arguments against Australia joining a global 'arms race' of industry subsidies. This is particularly so when other large economies are subsidising sectors that are not necessarily in Australia's traditional areas of comparative advantage (as a resources exporter and aspiring high productivity services economy).

Australia has a big opportunity from finding ways to open more to the world, even in this changing global context, particularly given our proximity and links to large, rising income economies in southeast Asia and India. The movement of goods, capital and people will continue to be important pathways for sharing knowledge and innovation in the global economy.

This reflects future sources of productivity growth, but also our history. Australia's policy experience with a 'fortress Australia' mindset (including high tariff walls, and restrictive immigration policies) led to Australia's economic performance falling well below peer countries in the decades leading up to the 1980s.⁶

⁶ Australia's average GDP per capita growth between 1970 and 1980 was about 1.3% compared with 2.7% in the G7 (based on an unweighted average of growth rates across the G7 countries).

1.3 A policy agenda for a more productive Australia



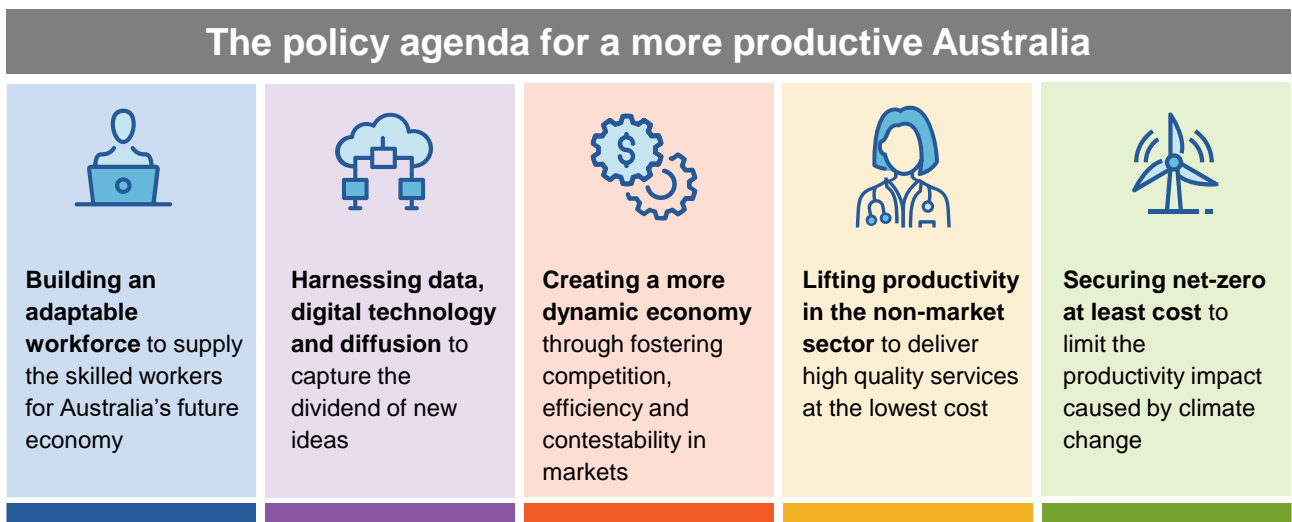
Australia's challenge is to raise the long-term rate of productivity growth. Therefore, the focus must be on the long-term fundamental enablers of productivity, and the role of government in reinforcing these.

Whether in the services sector (market or non-market), the resources sector, manufacturing, or agriculture, productivity increases come from:

- workers developing better skills
- businesses or government investing in more technology and equipment
- new ideas being developed, and the spread of good ideas to more businesses or more areas of government: management insights, technical knowledge, new technologies — for example, better solar cell technology allows us to harness solar resources more effectively.

The policy agenda presented here is based on applying these enablers to Australia's current economic and policy context — the productivity predicament.

The reform package



Responding to Australia's productivity growth challenges involves action on many fronts. The need to foster productivity in some hard-to-reach areas (services and the non-market economy) requires some broad-based enablers as well as some new thinking.

The reform agenda centres on five key themes:

1. **Building an adaptable workforce** to supply the skilled workers for Australia's future economy.

A highly skilled and adaptive workforce could be one of Australia's most important competitive advantages. It is an enabler of balanced growth and is particularly salient in those parts of the services sector that are traditionally labour intensive. Skilled labour can work with, and adapt to, technology; but also add greater value in performing the tasks that only people can do.

2. **Harnessing data, digital technology and diffusion** to capture the dividend of new ideas.

Policy should broaden beyond traditional channels for the generation of new ideas (including public and private research and development) and focus on the 98% of businesses that do not introduce new to the world innovation. The diffusion of ideas, their adoption and adaptation by the broad mass of Australian businesses is the main game in productivity policy. The uptake of digital technology is a key example of this, being supported by government data policy, infrastructure provision, use of regulatory technology (regtech) and cyber regulation.

3. **Creating a more dynamic economy** through fostering competition, efficiency and contestability in markets.

A dynamic economy is arguably the most effective diffusion machine, spreading new ideas through competition, trade, investment and labour mobility. Multiple policy areas can help foster business entry, expansion of efficient businesses and create incentives for productive investment. Some of these policy levers are general enablers like tax or land use regulation; others deal with barriers to competition that are specific to a particular sector.

4. **Lifting productivity in the non-market sector** to deliver high quality services at the lowest cost.

Innovation can be hard to achieve in parts of the non-market sector, as can the diffusion and spread of good practice. In some cases, building the right innovation 'infrastructure' is a key part of driving a greater culture of productivity growth in government. Even identifying modest ways to economise on labour in the delivery of some core services will be an important direction for reform.

5. **Securing net-zero at least cost** to limit the productivity impact caused by climate change.

Decarbonising the economy will require a large economic transformation over the next three decades as Australia pursues its 2050 Net Zero Emissions Target. Having the broad-based policy frameworks to reduce emissions and adapt to climate change at the lowest possible cost is a high priority for productivity growth.

These five enablers bring together 71 recommendations, resulting in a wide-reaching agenda for reform. Some recommendations are about bringing a hitherto underappreciated issue to greater prominence. Others are about changing the emphasis of existing policy approaches.

Our recommendations are geared towards the productivity challenges outlined in section 1.2, as well as the emergent opportunities for productivity growth.

Building a skilled and adaptable workforce



Improve quality in the education and training system to build human capital and increase the productivity of workers



Recalibrate skilled migration to fill skill gaps, improve matching and bring new ideas to the workforce



Get the gig economy right for both workers and consumers



Streamline workplace relations and occupational licensing to enable flexibility in the labour market

Only a few generations ago, significant parts of the workforce were largely trained on the job to do relatively routine tasks, with fewer requirements for formal education, for example in manufacturing and agriculture. Those sectors effectively took workers with low average formal education and provided them with relatively high paying jobs, largely because their labour input was augmented by capital (and land) and scientific advances that could generate greater output from the labour provided.

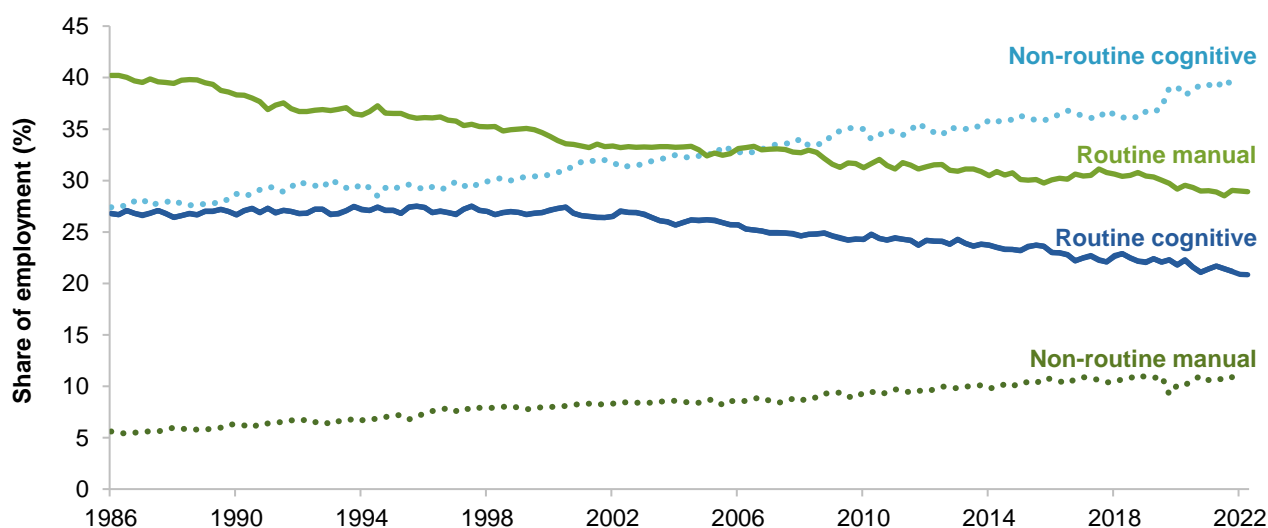
Many parts of the modern services sector have less of that flavour. These industries tend to be labour intensive overall, and high paying services jobs tend to have non-routine tasks and require high formal qualifications (figure 1.6). Where labour input dominates, there tends to be a premium on the skill of that labour — higher skilled workers tend to be more productive and higher paid.

Today, an estimated nine out of ten new jobs will require post-secondary qualifications of some kind.

Where technology is introduced, skill requirements tend to rise. Technology can substitute for labour but also complement it. The addition of technology can replace individual tasks (more often than entire jobs), freeing up workers to focus their efforts where they are most valuable.

As routine tasks continue to be automated, it is likely that newly created jobs will increasingly rely on distinctly human attributes like interpersonal skills, synthesis, judgement and critical thinking. Innovation — generating new, economically useful ideas — is particularly hard to automate.

These attributes are generally learned in the context of a particular application and are built on a foundation of strong literacy and numeracy, a knowledge-rich school curriculum and considerable tacit learning on the job. Services involve a degree of co-production between the producer and the consumer: inter-personal skills and empathy can be a key part of the overall value.

Figure 1.6 – Non-routine roles are on the rise^a

a. Based on a mapping from ABS labour force to Australian and New Zealand Standard Classification of Occupations job classifications. Non-routine, cognitive: Managers, Professionals; Non-routine, manual: Community and Personal Service Workers; Routine, cognitive: Clerical and Administrative Workers, Sales Workers; Routine, manual: Technicians and Trades Workers, Machine Operators and Drivers, Labourers.

These trends imply a premium on adaptability. As jobs evolve, workers must too.

Australia's education and labour market settings have served us well until now, but meeting the needs of the modern economy means catching up to these realities.

In a world requiring broad capabilities and adaptability, some policy settings still focus on narrowly defined occupations. Vocational training, industrial awards and occupational licensing have traditionally been premised on an ability to define the precise roles and competencies of occupations. Skilled migration has relied on occupation-based lists to define the economy's needs.

But a productivity lens sees the role of human capital differently. Skills that combine technical mastery with broad capabilities and adaptability are critical, as is the flexibility to apply those skills in ever-evolving ways. Education policy, migration settings and labour market regulation should be designed with that focus.

Improving the education and training system

Education plays a key role in boosting productivity through the quality of 'human capital' (the collective skills of the workforce) applied to the production of goods and services. Arguably, education is the most profound general-purpose technology ever developed — the ability to transfer knowledge from one individual to another in an accelerated way, simultaneously building the capability for further learning.

The four parts of the education 'system' — schools, higher education, vocational training and lifelong learning — work together to help deliver the skills and capabilities needed for a modern economy. Targeted reforms can ensure that each element works better, and that the system itself can work more coherently.

Two historical trends stand out.

First, over recent decades, Australian human capital has been bolstered mainly through the *quantity* of inputs — increasing the number of years of schooling, the share of the population enrolled in post-secondary education and increasing per student funding.

However, there are only so many years of formal education Australians are able and willing to do, and only so many resources (teachers and capital) that can be devoted to education. There is some remaining quantity dividend (in universities and in lifelong learning) but for the most part, delivering on Australia's future skills needs will require a tighter focus on increasing the *quality* of education for each dollar spent.

Second, while many parts of the economy have been dramatically transformed by technology and new business models, the basic structure of education delivery is remarkably similar to what it was many decades ago, whether in schools or in higher education. The disruption caused by COVID-19 has prompted a greater focus on the potential use of technology, not only to improve instruction and formative assessment, but to alter the way schools and tertiary education providers deliver their services.

Improving access to, and quality of, higher education

A range of targeted reforms to tertiary education could position providers to deliver a higher quality, more innovative and responsive service to students. Funding reform is a key part of this.

Despite large increases in student numbers in the last decade, further increases would still yield benefits. Reforming university funding arrangements would facilitate expanded access for Australians to tertiary qualifications. It would also facilitate more competition and address the unintended consequences that result from university efforts to manage the course mix — a response to the poor incentives embedded in the current funding model.

Through differing funding arrangements across the sector, governments have made various attempts to influence student choice of course and career. For the most part, these efforts are ineffective. Nor are they always desirable — students generally make reasonable choices and government skill lists are an imperfect guide to the needs of the future economy. Moreover, student choices are typically unresponsive to price changes at current levels — meaning that the existing approach to subsidies is neither effective nor efficient.

Governments should establish an effective and fiscally sustainable demand-driven system for providing Commonwealth supported places for domestic undergraduate students. This would better support students with reasonable prospects for success at university, with productivity benefits for the economy and higher lifetime wages.

Complementing this, governments could, through a new university funding model, better target investment while facilitating wider access to higher education. Under this model, total funding per student should be based on a measure of the efficient cost of delivery and the student contribution to this should increase with their future average expected earnings. A higher average student contribution — largely financed by income-contingent loans (so that higher prices do not deter study) — would be necessary to expand access while containing fiscal costs, and would be fairer, given the size of the private returns to education (reform directive 3).

In addition, there should be a proactive policy emphasis on enhancing the quality of education services provided. For a range of reasons, universities may not have adequate incentives to focus on quality teaching. While higher education providers in Australia perform well on many dimensions of quality (students are largely satisfied and have good employment outcomes), there are large variations across providers and a significant minority of higher education students rate their experience poorly.

Lifting the quality of tertiary education requires changing the incentives that individual teachers and their institutions face, which are shaped by government funding and regulation. This requires a multi-pronged approach.

The Australian government should require universities (and appropriate parts of the Vocational Education and Training (VET) sector) to, at no additional charge to students, share all lectures online. This would

improve the transparency of teaching quality and provide an incentive to invest in, and improve, teaching performance (reform directive 4).

A stronger external teaching quality assurance role for the regulator, and better published quality indicators would also support improved teaching performance, as would the Australian Education Research Organisation collecting and generating evidence on best practice. Funding research and rewarding innovation in teaching could be achieved through a modest Australian Research Council grant and building on successful approaches already implemented by Australian universities.

Governments should hold off implementation of the proposed performance-based funding of universities — which would encourage gaming, can be unfair and lacks impact — and instead explore the option of financial rewards for providers that have made successful efforts to improve teaching quality (reform directive 5).

Supporting a responsive VET system

Notwithstanding the strong growth of higher education, VET remains the largest provider of formal post-school training, serving more than twice the number of university students. Given this, overcoming systemic flaws in VET design is important.

Recent skills reforms are wide ranging and are designed to fundamentally re-shape the VET sector so that it is better able to teach, recognise and develop adaptive skills. The measures, if successfully implemented, will overhaul competency-based training as well as change the existing qualification framework and update training package content and development. Governments should ensure that cross-sectoral skills are prioritised, as well as promptly updating training packages (reform directive 7).

A more ambitious and sophisticated system will also necessitate investment in VET workforce capability. VET teachers and trainers will need further professional development support as the system adopts assessment models that include proficiency and independent assessment.

Beyond this, governments should gradually expand access to income-contingent loans to more VET students starting at the Diploma level, in part, so that expanded access to higher education does not come at the expense of VET. More equal loan access would give students a choice between different parts of the tertiary education sector based on capabilities, interests and skill needs, rather than financial barriers and arbitrary differences in government funding and financing policy.

Creating a culture of lifelong learning

Lifelong learning is a key part of Australia's education system but is perhaps the least well understood. It is also the area of education where policy is least developed. Nonetheless, it is a vitally important element of skills formation through a worker's life.

At present, education funding is concentrated on school education and the initial acquisition of formal qualifications through universities and VET. This is generally appropriate, but raises the important policy question as to whether more funding support should apply to ongoing training and if so, how it should be targeted and designed.

There is some risk that businesses will under-invest in ongoing education and training because they cannot capture the full benefit if the worker changes jobs (by one estimate, today's school leavers could have 17 employers during their working life). This could be particularly true where the training in question provides general skills (such as management) to complement an employee's existing specialist professional training. More generally, there can be financial barriers to people seeking to learn over their lives.

There is a role for government in helping create a culture of lifelong learning as part of a joint effort with businesses and individuals. Many people already engage in lifelong learning, so it is important that any

government assistance generates additional investment in upskilling and reskilling, as opposed to subsidising learning that would have occurred anyway (reform directive 4).

Action by governments on many fronts is required: providing quality, consolidated information as to the training options on offer (reform directive 5) and encouraging universities to provide more 'nested' qualifications for those who complete part of a course (reform directive 6). In addition, governments should continue exploring targeted financial assistance through business- and individual-based tax breaks — evaluating channels like the Skills and Training Boost and incrementally expanding the use of deductible self-education expenses (reform directive 4).

There is a complex myriad of supports for lifelong learning. It is important to bring together existing measures into a more coherent strategy. A more unified approach, backed by co-operation between the Australian and State and Territory governments could bring focus to this policy effort, reducing overlaps and filling gaps in policy coverage to increase uptake.

Make best practice common practice in schools

School education provides the foundation from which further study builds. It also contributes to well-being and the ability to effectively navigate everyday life.

However, academic achievement among children is stagnating while resourcing (per student) has increased, suggesting that the productivity and effectiveness of schools has been declining in recent years.

One way to envisage the challenge for the school system is to compare it to the dramatic improvements achieved in respect of health and longevity over the past century and a half. That health transformation came about through scientific and technological advances, improved medical professionalism, and multiple public health interventions. What could the equivalent transformation look like in respect of education?

To achieve change will require more effective use of school resources, including freeing up teachers' time from low value tasks and administrative burdens to focus on quality teaching. The most likely drivers are increased use of effective educational technology; an improved evidence base that more directly informs day-to-day teaching practice; and innovation and disruption in models of schooling.

Digital technologies hold promise — to augment teacher-led instruction, provide formative assessment of student progress and replace some manual administrative processes (reform directive 1). Digital technologies can expand access to quality teaching and help address the difficulties associated with teaching out of field. The uptake of digital technology through COVID-19 shows that rapid (albeit temporary in this case) transformation of the school model is possible.

But not all technology is necessarily effective. There is a role for government to provide guidance to teachers, schools and systems about digital learning options with proven efficacy.

Governments can also help to enable best practice to be common practice across the education system. Diffusing best practice is challenging. Sharing teaching expertise through observation and feedback is part of addressing this. So too is the design and dissemination of high-quality, evidence-based teaching materials such as lesson plans for use in the classroom. This approach would rely less heavily on individual teachers to work out how to best translate the national curriculum into lessons — a task that teachers are not always able to do effectively given the many demands on their time (reform directive 1).

Finally, we should be open to a degree of innovation in models of schooling. This could include different governance structures, or different delivery options such as online lessons (at home and in the classroom), variations in school hours, and use of technologies to personalise students' learning environment. As a first step, governments can ensure there are no unnecessary barriers — legislative, regulatory, administrative or otherwise

— that prevent schools from experimenting in ways that better enable students to learn. New trials should also incorporate evaluation and diffusion of school-based innovations that are proven effective (reform directive 2).

Recalibrating skilled migration

Australia is an attractive location for skilled migrants. As a safe, high-income economy with a multicultural community and a track record of absorbing population growth (well above the OECD average), we have an ability to use skilled migration as a policy tool. Immigration is, among other things, a key economic asset, which should be used to good effect.

Using the skilled migration program to boost productivity requires a shift of emphasis. It requires that we see skilled migration not just in terms of filling specific occupational gaps, but also (and more so) the role migrants play as an essential source of new ideas and information. Through experience with frontier technologies and different management approaches developed and practised overseas, skilled migration is a key driver of the effective diffusion of knowledge and new technologies across the Australian economy (reform directive 8).

Currently, migration program settings that are meant to meet the needs of the labour market are heavily reliant on skilled occupation lists to restrict the scope of both permanent and temporary skilled migration. In many instances, skill lists fail to effectively track labour market shortages.

To improve the productivity dividend from skilled migration, the Australian government should move away from relying solely on skilled occupation lists for both temporary and permanent skilled migration. Instead, the Australian government should introduce wage thresholds for employer-sponsored skilled migration (including age-contingent wage thresholds for sponsored *permanent* migration), removing list-based restrictions above those thresholds.

Settings for independent permanent migration should also be amended to place more emphasis on ongoing employment and income (as opposed to qualifications alone) as well as age.

Moreover, a better-designed temporary skilled migration visa that could meet the needs of migrants and employers alike could reduce reliance on permanent migration (which typically entails greater fiscal risks related to the older average age of permanent migrants). In particular, the duration of temporary migration could be increased, offering a viable alternative for workers at different stages of their work-life.

A range of other steps should also be taken to improve the composition of the migrant intake. The Australian Government should abolish visas with a poor rationale and questionable benefits, such as the Business Innovation & Investment permanent visa program (which does not achieve its policy aim and has poor fiscal outcomes).

Finally, the Australian Government should eliminate unnecessary barriers that impede the immediate employment of newly arrived migrants by streamlining the processes that recognise qualifications from abroad.

Getting the gig economy right

The gig, or platform, economy has been a prominent source of disruption in multiple markets.

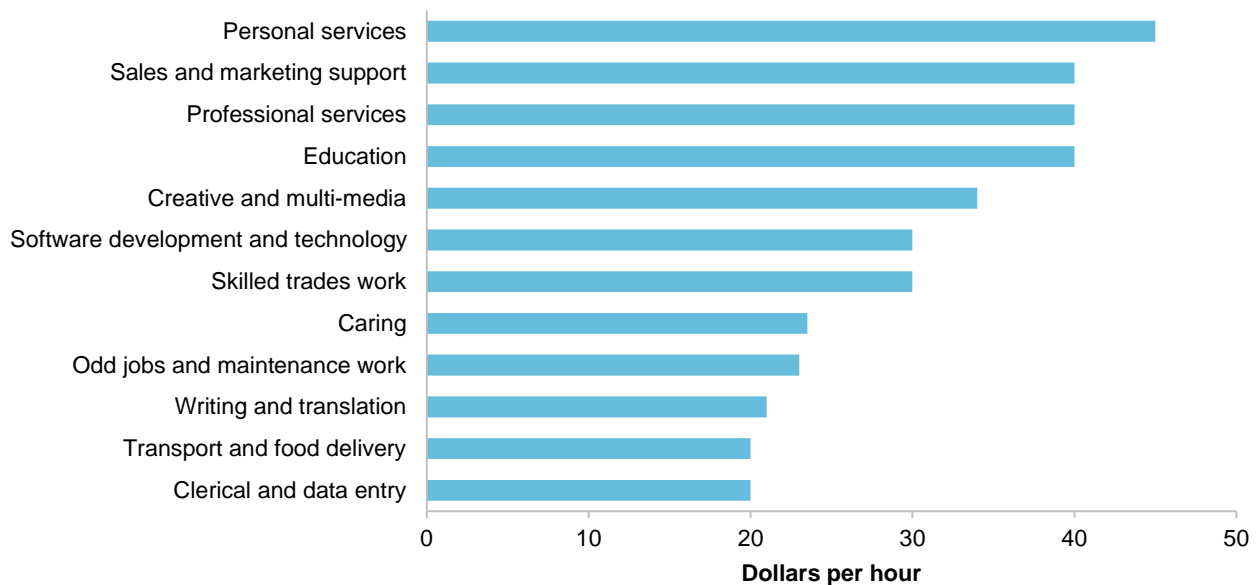
Like all disruptions, it has brought benefits and prompted some concerns. As noted in section 1.2, innovation in the services sector often involves fundamental changes to business models and the way consumers experience a service. As a result, it can test regulatory frameworks; regulators have to show similar adaptability to that required of the workforce as a whole.

Platform work can contribute to productivity through improving matching efficiency in service markets and spurring technological innovation by platforms and their competitors. It allows for better quality services and convenience for consumers and has introduced competition to otherwise stagnant markets.

While the most prominent examples of platform work are ridesharing and food delivery, platform work exists in other industries, with different work arrangements and work characteristics, including aged and disability care, professional and trade services, specific tasks and odd jobs. Conditions and pay also vary greatly across industries (figure 1.7).

Figure 1.7 – Platform workers' earning rates vary by type of work^a

Median earnings per hour in 2019



a. Estimates from the National Survey are approximate only as it is unclear whether respondents reported gross or net earnings after cost, some respondents may work for platforms in different categories of work, data is categorised by the type of main platform, and the sample size is low.

The concern about platform work is that as contractors, platform workers have limited access to certain employment rights and entitlements.

But simply imposing employee status in all cases would effectively erode many of the productivity benefits and flexibility for workers that arise from platform work as currently arranged.⁷

Calibrated government intervention could address some of the regulatory gaps created by platform work, while maintaining its productivity benefits. For example, given that the provision of insurance can be insufficient under current arrangements — either where platforms or individuals fund their own workers insurance — a more comprehensive solution could come in the form of a mandated baseline level of insurance, an industry-wide insurance scheme, or extension of workers compensation. Governments should evaluate this possibility for classes of platform work where there are material risks to worker safety, where there are many platform workers and hours worked, and where workers are low paid.

Similarly, where access by platform workers to dispute resolution services is particularly poor compared with employees, governments should encourage platforms to improve their own internal resolution processes. This should be backed by an independent dispute resolution body within the Fair Work Commission, to provide conciliation and arbitration services, with such services to be funded by platforms (reform directive 12).

⁷ Contractors generally cannot access employment entitlements, such as legislatively guaranteed minimum pay and conditions, access to workers compensation or unfair dismissal laws and the ability of platform workers to access dispute resolution processes, insurance arrangements and workplace health and safety oversight and advice can be difficult.

Streamlining workplace relations and occupational licensing

Reforms to skilled migration, schools and tertiary education are essential for building an adaptable and productive workforce. But maximising the benefits of those reforms requires policy settings that better facilitate the free movement of people across jobs, businesses and occupational roles. This includes the ability of businesses and workers to adapt existing jobs to improve work practices and productivity.

The workplace relations system must continue to enshrine minimum standards of fairness and ensure that opportunities to improve productivity are not eroded by conflict, missing incentives or red tape. Part of how this is to be achieved is by placing a high emphasis on co-operation between parties.

There are three broad areas where greater ongoing incremental reform can create opportunities for business-based productivity improvement: the award structure, the ability to make a formal enterprise agreement, and the content of those agreements (figure 1.8).

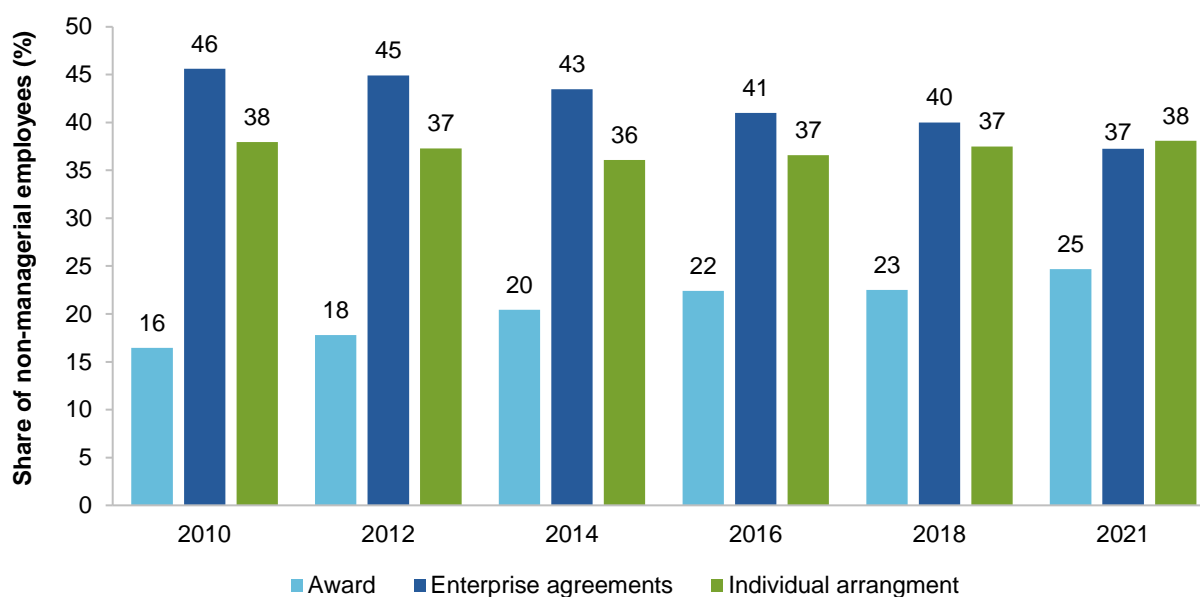
In general, the move to enterprise level bargaining over the last 30 years has been a significant source of business-based (and economy-wide) productivity. However, the share of workers covered by enterprise agreements has fallen in recent years, and a large proportion of agreements are simply rolled over, so the scope for them to improve productivity depends on whether existing clauses leave room for future flexibility. The reduction in enterprise bargaining warrants a policy response.

That response starts with a strong renewed focus on the award system itself. First, many businesses and workers will likely always remain in the award system. For low paid workers, strong award compliance is of critical importance: simpler awards and the continued encouragement of award regtech solutions are key. For award-reliant workplaces to access flexibility, they need simpler awards and easier processes to amend them.

Second, the structure of awards forms the baseline for enterprise agreements via the Better Off Overall Test. Simpler, more adaptive awards can indirectly smooth the path for mutually beneficial enterprise bargaining.

Figure 1.8 – Awards have grown in importance for non-managerial employees

2010–2021



To these ends, the Australian government should amend the Fair Work Act to improve award-making processes, and further simplify and adapt awards where feasible (reform directive 11). A positive recent development in the award system was the inclusion of loaded rates in the Hospitality Award — effectively providing options to award-reliant businesses to pursue a specified alternative pay structure. More use could be made of such optional approaches, overseen by the Fair Work Commission, and enshrining consultation requirements.

In addition, the Government should remove barriers to effective agreement-making in the enterprise bargaining system by modest changes to the Better Off Overall Test. The Fair Work Commission could have expanded ability to approve an agreement where there is overall employee support and overall benefits, subject to a range of public and private interest tests.

Enterprise bargaining could be better leveraged to improve productivity through limitations on certain types of clauses that hinder productivity improvement. For example, some enterprise agreements contain restrictive consultation clauses that require majority employee consent to implement changes in work practices. Such clauses can block the adoption of more efficient production processes, especially where they may be labour saving. The Commission's proposed solution is to give the 'model' consultation clause prescribed in the *Fair Work Regulations 2009* legal effect over more stringent terms in agreements. This would both promote productivity enhancing changes without stifling mutually beneficial consultation between managers and their employees. The Government should also remove barriers to effective agreement-making in the enterprise bargaining system by modest changes to the Better Off Overall Test. The Fair Work Commission could have expanded ability to approve an agreement where there is overall employee support and overall benefits, subject to a range of public and private interest tests.

Simplifying and harmonizing occupational licensing

Australian governments have implemented a significant reform of occupational licensing through the automatic mutual recognition of several licences across (most) state borders (reform directive 9). There is scope to expand this principle to also enable the targeted recognition of overseas licences.

A further (and harder) reform is to tackle where licences and professional registration are truly necessary, and the scope of practice that should be covered.

Licensing plays an important role in signalling quality and ensuring minimum standards of safety. But excessive and rigid requirements reduce the flexibility with which workers can move between sectors and jobs, and can inhibit competition, which tends to increase prices compared with a market with a voluntary, or no, regulatory licensing regime.

When designed well, the higher price imposed by licensing regimes is justified by the lower risk to consumers. However, if the objectives of licensing regimes are already achieved by other means such as safety legislation, or if the extent of the restriction is not matched by improved outcomes (or worse, actually impedes the provision of safer or higher quality work), then licensing reform — such as expanding scope of practice for other providers — could improve productivity without compromising service quality and safety.

Building on automatic mutual recognition, governments should continue to develop digital licensing platforms to facilitate more information sharing and help pave the way for further integration of licensing across jurisdictions.

There is also substantial potential productivity benefit in the hard grind of ongoing review of licensing policy, to test whether licensing is necessary (over and above other available forms of safety regulation and consumer protection) and whether requirements remain fit for purpose (reform directive 10).

Expanding scope of practice to increase healthy competition

The scope of practice covered by a licence determines the types of services that are regulated, and hence, is a key determinant of how accessible and affordable these services are. A perennial pair of problems in this

context is that (i) some suitably skilled practitioners are not licensed to provide certain services, and (ii) some licensed practitioners are not operating on the boundary of their licence.

For example, in the health sector, nurse practitioners (NPs) can perform many tasks that only general practitioners (GPs) — who are in relatively short supply — are licensed to provide, such as diagnosis and prescribing services. This means that GPs undertake many tasks well below the upper boundary of their capabilities while NPs have skill sets that are not fully utilised. This can result in patients facing needlessly long wait times and higher than necessary prices, and taxpayers footing unnecessarily high medical bills. A similar situation exists for pharmacists with respect to their ability to perform some straightforward tasks that would otherwise be performed by a GP.

In health services, States and Territory Governments should trial expanded evidence-based scope of practice for pharmacists and other non-medical health practitioners, such as those undertaken in New South Wales and Queensland with regard to the prescription scope of pharmacist's providing vaccinations and low-risk medications. The Australian Government should ensure that the novel arrangements that are the subject of these trials are given sufficient funding through Medicare or the Pharmaceutical Benefits Scheme (PBS) (reform directive 10).

More generally, Australian governments should work with their regulators to re-examine boundary issues relating to occupational licenses, particularly where independent reviews have already highlighted potential gains (reform directive 10). In continuing to develop their digital licensing platforms, governments should prioritise choices in technology and design that enable data collection that can inform effective licensing policy and future information sharing between jurisdictions.

Faster recognition of migrant qualifications

Suitably licensed skilled migrants represent a potentially fast and efficient way to augment domestic labour supply, increasing productivity via diffusion and skill sharing, and improving access to technical services for Australian businesses and consumers.

At present, the system that regulates mutual recognition of migrants' qualifications acquired overseas, including occupational licences, is not well integrated with the requirements for skilled migrant entry. Before skilled migrants can work in Australia, they need to obtain a second set of approvals via an often opaque, difficult-to-navigate and time-consuming process. The upshot is long delays before migrants can begin work or suitably skilled migrants being unable to work in the field and occupation in which they were trained, to the detriment of Australia's economy.

Where there is sufficient alignment or equivalence of different licensing regimes between Australia and international jurisdictions then mutual recognition should be pursued by the Australian Government. Such an arrangement would do away with the secondary approval process for suitably qualified migrants, while preserving the benefits of licensing in promoting safety and quality of service (reform directive 9).

The Australian Governments and regulators should pursue further international mutual recognition of occupational licences by improving (and potentially formalising) links between Australian licensing bodies and those in similar countries.

Where there is not sufficient alignment or equivalence of different licensing regimes between Australia and international jurisdictions and mutual recognition is yet to be implemented, then requirements for migration should be aligned with the requirements of regulatory licensing bodies.

Harnessing data, digital technology and diffusion



Focus on **innovation for the 98 per cent** to drive productivity gains through the adoption of new ideas



Address barriers to the adoption of technology to **bank the data and digital dividend**

Productivity growth relies on innovation and new technology. Across the world, considerable policy attention and public funding has focused on how to generate new breakthrough ideas. But this leaves out an important element of the innovation story. Fewer than 2% of Australian businesses actually engage in 'new-to-the-world' innovation. This is not a criticism — just a reality.

The critical and forgotten element in innovation strategy is how to stimulate the adoption of new ideas by the remaining 98% of businesses. There is a major dividend in diffusion — the spread and adaptation of the ideas of others for use in everyday business applications. Arguably for productivity growth, it is the main game.

The diffusion of digital technologies is a stark example. The adoption of these technologies across the economy has already been transformative. In just a couple of decades, smartphones have become ubiquitous, social media has changed the way we communicate and consume, and the volume of data we can draw on to inform our decisions has increased exponentially. The productivity benefits of digitisation and technology enabling us to collect, transmit and analyse data faster and at lower cost, are potentially vast.

Innovation for the 98%

Innovation policy needs to refocus to place more emphasis on the 98% of businesses who are not world-leading innovators and are unlikely ever to be (figure 1.9). For these businesses, innovation is about the adoption and adaptation of existing, but more effective and efficient technologies and ways of doing business, rather than formal research and development (R&D). Policy support focusing on lowering the cost of R&D or the commercialisation of patentable intellectual property tends to miss the way most businesses around Australia innovate on the ground.

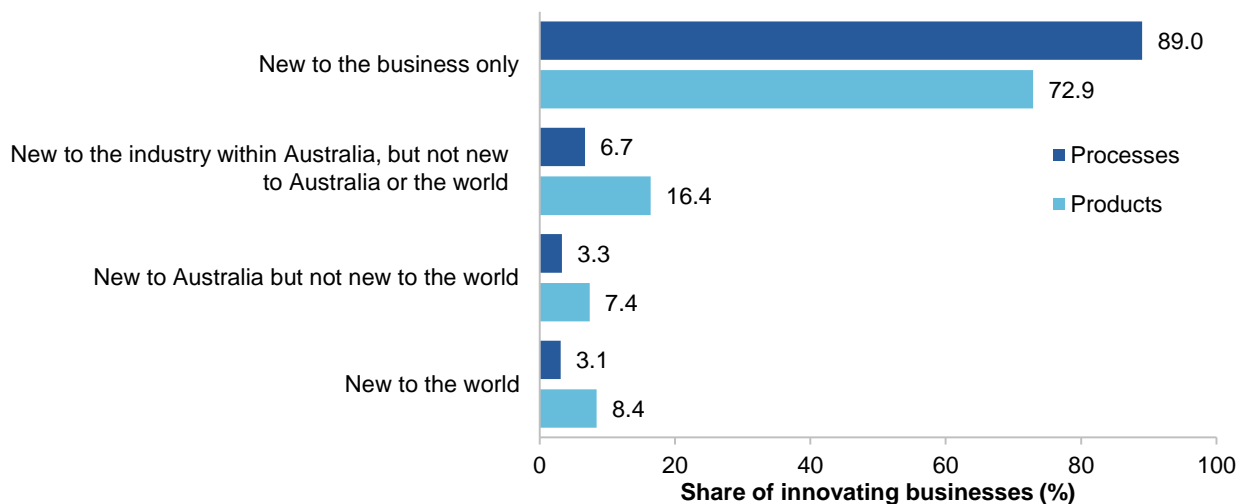
Most businesses are not operating at the technological frontier. Supporting the diffusion of existing good ideas and effective business models will help to narrow the gap between them and the best performers, increasing economy-wide productivity.

The challenge is that the role for government is less clear. Government has a number of established policy tools that address traditional channels for high-end innovation: formal research and development is supported by tax incentives and public funding; linkage programs and commercialisation incentives operate to bring intellectual property (IP) developed in universities to the private sector.

The levers to enable diffusion (the innovation of the 98%) are a multitude of other policy settings, which are not always primarily focused on innovation per se. The general dynamism of the economy (discussed in a later section) affects the ease with which ideas are diffused and innovations adopted.

But it is important that policy makers also identify and focus on key channels by which knowledge is transferred. For example, improving the skilled migration program and reducing barriers to foreign direct investment and trade in services would have substantial benefits for diffusion.

**Figure 1.9 – Most Australian business innovations are only new to the business^a
Product and process innovation, 2 years ending June 2021**



a. Process innovations include new or improved methods for producing goods and services; organisational forms; and marketing methods.

As discussed in the previous section, skilled migrants provide a direct channel of diffusion, bringing knowledge about frontier technologies and practices developed overseas into domestic businesses. Similarly, linkages overseas via trade and foreign direct investment (FDI) give Australian businesses access to information and ideas about innovation from the global frontier, while also bringing expertise and good management practices. Minimising trade barriers and FDI fees is important to maintain this channel for diffusion.

In some cases, the need for better diffusion should prompt government to think differently about its traditional role. Multiple government agencies collect data from businesses, which — if well curated and presented — could help businesses benchmark their performance against like businesses (reform directive 16). The use of tailored information with easy-to-understand benchmarking results and qualitative case studies, could be highly beneficial in spurring the adoption of technology and adapting innovations occurring elsewhere in the economy.

Some Australian Government agencies such as the Australian Tax Office and the Australian Bureau of Statistics have made progress in this area, but these efforts could be broadened and extended.

Governments can also better leverage the university sector. Existing research and training linkages tend to focus on identified sectors (often those where innovation already occurs). A better approach would be to make them more industry-agnostic, to encourage diffusion in some less traditionally innovative sectors (reform directive 16).

A concerted effort to reduce the barriers for academics to consult with private industry, via simplified and well understood processes, could also aid the flow of knowledge, particularly in those sectors where larger scale joint research or commercialisation of IP is less relevant.

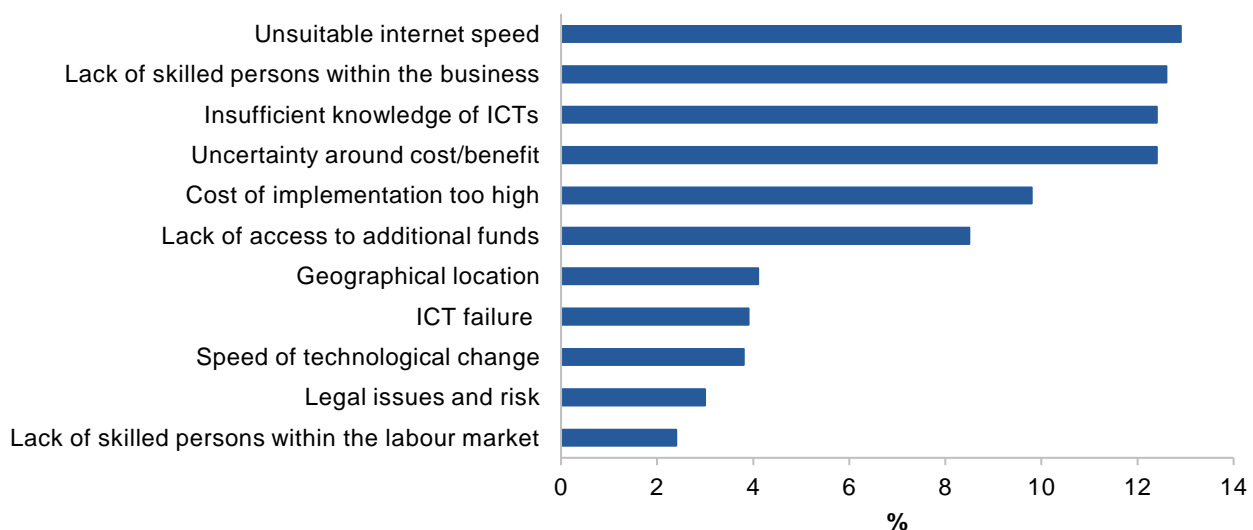
The business community, via industry associations and business networks, is one of the most important channels for diffusing information about innovations. Governments could increase their partnerships with intermediaries like industry associations and other advisory or network bodies to create programs that facilitate the flow of information (such as capability development initiatives and extension services). Government could also directly increase the transmission to businesses of information about innovation by requiring open access to government funded research.

Banking the data and digital dividend

Technology changes rapidly and new productivity-enhancing applications are continuously emerging. Technologies such as AI, the internet of things (IoT), robotic automation and big data analytics are underutilised in Australia and could deliver large productivity gains. Addressing barriers to the adoption of these technologies, promoting efficient and safe use of data and creating an environment that encourages digitisation is vital to ensuring future productivity growth.

As always, the role for government must be carefully calibrated. Businesses will make their own decisions as to the value of investing in new technology. Not every investment works out for every business. But government plays a large role in driving adoption through its own activities (such as regtech), infrastructure provision, boosting skills and — perhaps most transformative of all — promoting large scale data availability, which is the feedstock for much of the digital economy (figure 1.10).

Figure 1.10 – Internet speed and lack of skills are the biggest barriers to adoption
Share of businesses citing each factor as limiting their use of ICTs, 2019-20^a



a. This chart uses weighted estimates as published in ABS (*Characteristics of Australian Business*, 2019-20 financial year, Cat. no. 8167.0).

To maximise the economic and social benefits of digital technologies and data, Australian governments should reform their approach to digital infrastructure investment, expand the safe sharing of government-held and funded data, and ensure rules and regulations for the ethical and secure use of digital technology and data are fit-for-purpose.

Better and more cost-effective provision of digital infrastructure will be important in raising productivity for Australians living and working in the regions (i.e. outside major cities). Beyond the potential economic gains, improving digital connectivity in these areas will significantly improve wellbeing by enabling higher-quality delivery of everyday services such as telehealth, online education, online banking and remote work. To this end, ensuring that the types of investment governments are currently making in regional digital infrastructure represents the most efficient approach, will be important (reform directive 13).

The current arrangements for government digital infrastructure funding are highly disaggregated across a patchwork of different programs. But there is little transparency about how investment decisions are made, making them hard to assess. Subject to sufficient market testing and maturation of the market, governments

should consider competitive tendering as a more efficient way to deliver digital services to regional and remote areas.

Data holdings — public and private — in Australia have been underutilised due to unclear obligations about who has rights over the data, and hence is empowered to share and use it, as well as concerns about the safe transfer of data, and privacy. Initiatives like Australia's Consumer Data Right (CDR), first rolled out in July 2020, provide an example of how to successfully overcome these issues. The CDR empowers consumers in the banking and energy sectors to safely share data collected by a business about them across different product and service providers. In the absence of the CDR, that data would almost certainly be closed to other businesses, effectively stymying competition and innovation by prospective service providers.

Expanding this type of consumer led, 'safe, but open' approach to data sharing across the economy, including to government run and regulated service providers (e.g. health, education, aged care and childcare) could similarly encourage innovation that lowers the cost, while improving the quality, of service delivery for consumers. And increasing the depth and breadth of data holdings available for analysis would underpin better system-level policy decisions (reform directive 15).

Governments also have a role to play in setting the rules relating to the ethical and secure use of technology and data to foster consumer trust and confidence and ensuring these issues do not become a barrier to adoption. But government intervention such as regulatory requirements should be targeted to high-risk areas so as to avoid unduly inhibiting productivity-enhancing investment and innovation.

The government has already started to regulate critical infrastructure sectors at high risk of cyber-attack;⁸ however, these measures will need to be reviewed and evaluated to ensure that the added regulatory burden does not create a barrier to investment. And streamlining cyber incident reporting via a single interface would reduce the administrative cost on businesses associated with the current plethora of reporting requirements to multiple regulators (reform directive 14).

Government can also help guide the ethical use of data and digital technologies, such as AI, facial recognition and automated processes, while avoiding stifling innovation and giving businesses and consumers confidence to invest in and use the technology.

Economic dynamism describes the process by which businesses are created, grow and often fail; by which workers move from one job or one industry to another; and by which capital is deployed to new uses through investment and through businesses trying out new business models.

On some measures — business entry and exit rates, investment and labour mobility — the Australian economy appears less dynamic than in the past. The cause of this is unclear and there is unlikely to be a single solution.

Overall, the general competition law in Australia is well designed and effective. Periodic improvements can be made, but need to achieve a delicate balance. The potential for unintended outcomes abound. For example, more restrictive merger laws designed to reduce market concentration could also prevent less productive businesses from exiting the market. Similarly, large businesses (which implies high concentration) are often the source of new competition when they move into markets — potentially supporting productivity growth.

⁸ *Security Legislation Amendment (Critical Infrastructure) Act 2021 (Cth) & Security Legislation Amendment (Critical Infrastructure Protection) Act 2022 (Cth)*

Creating a more dynamic economy



Freeing up trade and increase foreign investment to increase competition, improve access to capital and enhance the flow of ideas from abroad



Driving productivity through tax reform to improve labour supply, savings and investment decisions, improve ease of entry, and improve risk management



Improving risk management and insurance to increase the coherence of Australia's 'risk protection system'



Lowering costs with regtech to achieve better outcomes from, and lower the compliance burden of, regulation



Finding a better approach to location and mobility to allow land to go towards its highest value use

There are many areas of economic policy that, in principle, could improve the dynamism of the economy, including some already discussed. The Commission has selected some key areas for particular focus, which could spark competition and new business models:

- continued openness to global investment and trade, including trade in services
- ongoing reform of taxation
- a new, holistic focus on risk protection and insurance
- improving regulation through technology
- more efficient approaches to location and mobility.

Freeing up trade and increasing foreign investment

In Australia, new competition and market entry often comes from the rest of the world — either through a foreign entrant investing in the Australian market, or through trade. These are important channels for the diffusion of frontier innovation. Hence, productivity growth can be advanced by being generally open to import competition, having low barriers to foreign direct investment, and by advocating for rules-based systems of global trade.

There are potentially large opportunities in global services trade, particularly in the wake of COVID-19 and the expanded uptake of remote working. Trade in services can be an export opportunity for Australia (as it has been in tertiary education) but it can also open up parts of the economy previously regarded as closed to foreign competition. This should be a focus of future bilateral and multilateral trade negotiations and also has implications for a range of regulatory settings, including skilled migration, recognition of overseas qualifications (discussed earlier) and domestic licensing requirements.

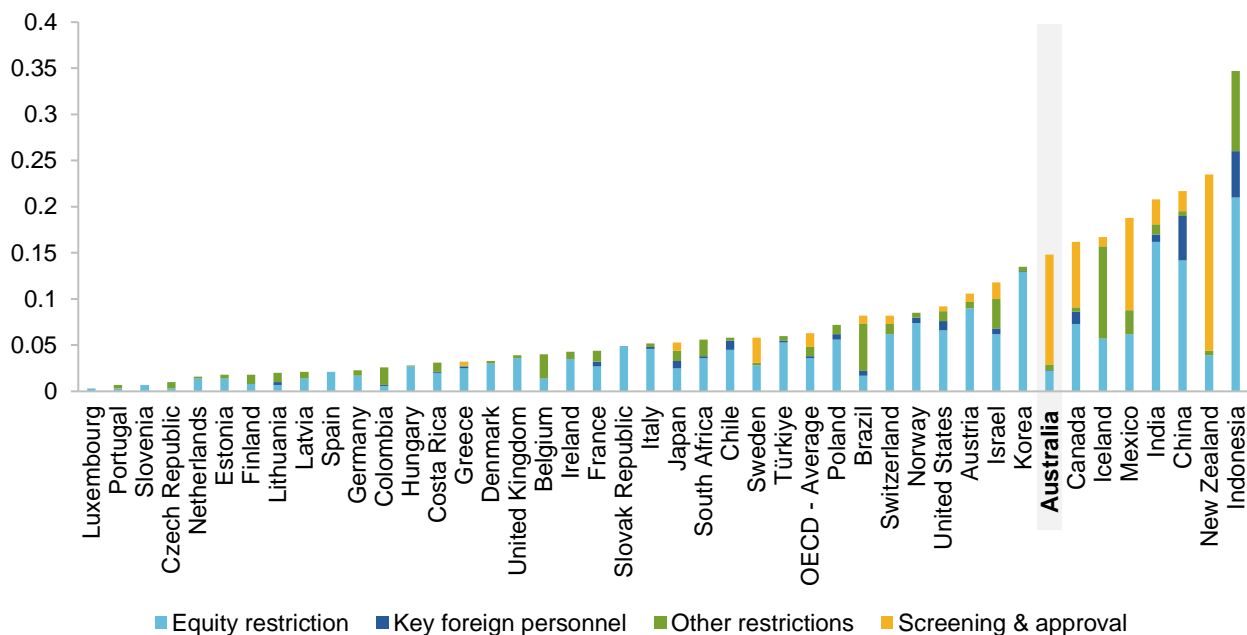
Australia could also achieve greater openness through increased acceptance of international product standards, and a gradual reduction in the use of anti-dumping and countervailing measures (reform directive 21).

More generally, tariffs on goods imported into Australia now collect so little revenue that the cost to businesses from complying with the various administrative requirements is much larger (free trade agreements reduce many tariffs to zero but only if the importing business files the correct forms). Indeed, for every \$1 in revenue raised by tariffs, the Commission has estimated \$0.60 to \$1.50 is lost in economic activity. Accordingly, the Australian Government should unilaterally reduce Australia's remaining statutory import tariff levels to zero.

Australia has traditionally been open to foreign investment, as evidenced by relatively high FDI as a share of the economy compared with global peers. However, official FDI screening and approval processes are seen as more restrictive than in other OECD countries (figure 1.11).

Figure 1.11 – Australia’s FDI processes were already relatively restrictive in 2020^a
OECD FDI restrictiveness index

Index 1 = Maximum restrictiveness



a. Australia implemented changes to its screening regime from 1 January 2022.

Australia’s FDI fees are well in excess of cost recovery, which risks deterring FDI flows. Application fees for proposed foreign investment should aim to recover costs and not be used as a method of general revenue raising. Application fees for proposed FDI into agricultural land assets should be brought closer into line with other forms of investment.

The COVID-19 pandemic and strategic tensions have focused increased attention on supply chain resilience. This partly reflects business decisions to source inputs domestically or have more redundancy in supply chains (a move from ‘just in time’ to ‘just in case’). This comes at some cost, but often reflects an efficient response to new (or newly understood) risks. Overwhelmingly, supply chain risk management lies with individual businesses.

In cases where there are calls for proactive policies to stockpile or support domestic production of strategic items to deal with national supply chain risks, a targeted and evidence-based response is required. The Office of Supply Chain Resilience (OSCR) can play a key role in ensuring that rigorous appraisal, a degree of transparency and a focus on opportunity cost underpin Australia’s response to supply chain issues. The OSCR should provide cost estimates and develop of a rigorous methodology for considering the broader incidence of any government support for stockpiling or domestic production as a solution to perceived supply chain risks (reform directive 21).

Driving productivity growth through tax reform

Australia's taxation settings have a key influence on productivity. By taxing some activities at higher rates than others, the system can skew incentives and economic activity away from more productive activities.

Governments will inevitably consider changes to taxation from time to time, including options to address the ageing population, changing consumption patterns and the need for fiscal repair. When doing so, it will be important to ensure that decisions are consistent with the broad aim of boosting productivity growth. Aspects of the tax system that warrant particular attention are those that influence:

- **skilled labour supply decisions** — particularly via income and payroll taxes, which can affect labour market participation, hours worked, incentives for further human capital investment and incentives to migrate to Australia. These can be compounded by aspects of the transfer system, which can lead to high effective marginal tax rates. Other payments, such as childcare subsidies, can alleviate adverse incentives over some income ranges
- **saving and investment decisions** — which can be distorted due to the varying tax treatment of different savings options, gaps between the corporate tax rate and marginal personal income tax rates, and differential tax rates for large and small companies. Corporate investments can also attract different tax treatments according to statutory depreciation allowances and whether the investment is financed by debt or equity
- **ease of asset transfers and efficient capital allocation** — which can be significantly impacted by transaction taxes like stamp duty. These taxes can hamper worker mobility and housing choice and be a barrier to transactions that transfer assets to higher value uses
- **ease of entry and competition** — consolidation rules and the non-neutrality of taxation of corporate debt and equity could contribute to incumbency bias, particularly if new businesses are more likely to initially be financed through equity
- **risk management** — which can be hampered at the margin by state insurance taxes. The asymmetric treatment of profits and losses could also work to diminish businesses' risk appetite (though this is not easily corrected).

In general terms, both tax rates and tax neutrality issues will be highly relevant to productivity. The marginal excess burden (a measure of the economic distortion or efficiency loss caused by taxation) from a tax tends to rise exponentially with the tax rate. Working towards greater neutrality of tax between businesses, savings vehicles and labour vs. capital income should have positive impacts for tax efficiency and productivity.

The benefits of even small improvements in the efficiency of the tax and transfer system could be substantial given Australian governments collect almost \$600 billion in tax revenue (in 2020-21). Just a 0.1 percentage point fall in the average excess burden of taxation would amount to a saving of about \$600 million in lost economic activity.

In addition, tax neutrality between corporate debt and equity has received increasing attention. Notwithstanding Australia's dividend imputation system, there is the potential for investment to be discouraged when businesses finance it through equity (and thus need to make more than the normal return). While a number of reforms have been canvassed to deal with this, one advantage of the Allowance for Corporate Equity proposal is that it effectively taxes marginal investments (those making a normal rate of return) at or near zero, thereby potentially encouraging new investment (Volume 3).

As governments (Australian and State and Territory) alter the tax system over the next decade, they should look to systematically transition the system to be more supportive of productivity growth across the five domains outlined above (reform directive 20).

Improving risk management and insurance

A new and under-appreciated policy theme is Australia's heavily regulated and extensive system of public and private risk protection.

This 'system' (though it is rarely recognised as such) consists of private insurance, mandatory contributory schemes (workers compensation and compulsory third-party insurance) and the publicly funded social safety net (which combines risk management, redistribution and in-kind services).

These elements have developed by increment and without holistic design.

This ad hoc 'system' of risk protection and insurance lacks coherence and arguably has become a potential barrier to innovation and productivity growth on a range of fronts:

- gaps in risk protection can reduce risk appetite (such as diminishing willingness to change career or start a business), which could reduce the dynamism of the economy
- the tax and transfer system can create adverse work incentives, affecting labour supply
- regulatory restrictions on private insurance can discourage new approaches to prevention, and more efficient service design, thereby limiting innovation and more productive outcomes
- publicly funded programs do not always give sufficient weight to insurance principles like maximising long-term outcomes and cost containment.

Unlike the retirement savings system, which has a recognised architecture, the risk protection system in Australia is not well understood. A generational review and reform process that holistically assesses the complex inter-linkages across Australia's risk protection system could yield significant productivity gains across many of the themes highlighted in this report (a more dynamic economy, more productive non-market services and improved human capital).

Such a review, and ongoing reform process, should focus on:

- **the impact on individual entrepreneurship** — Australia and New Zealand are outliers in following a 'social assistance' approach to income replacement in the event of job loss (primarily via Jobseeker). Other OECD countries have contributory unemployment insurance schemes, providing materially higher near term 'replacement rates' — cushioning the blow of job loss. It is possible (though hard to assess) that this could diminish risk appetite for Australian households, with a cost to economic dynamism. Australia is unlikely to embrace a contributory scheme, but options could be explored involving income contingent loans and/or modest expansion of income protection products through group life insurance obtained via superannuation.
- **barriers to innovation and new service models** — Private insurers are heavily restricted in the services they can offer. Health insurers cannot fund out of hospital services for which a Medicare Benefit could be paid. Life insurers cannot fund health interventions. But both are exposed to the cost of ill health (through hospital benefits and income protection policies respectively). The burden of disease is shifting to chronic conditions, which require management and prevention (hospitalisation being a costly last resort).
 - Regulation and incentives stand in the way of health and life insurers delivering innovative solutions, while the Medicare-funded, fee for service primary health system locks in a time- and labour-intensive service model for managing chronic disease.⁹

⁹ The PC's case study, *Innovations in Care for Chronic Health Conditions*, highlighted that most innovative, low-cost initiatives were succeeding on the ground despite, rather than as a result of, existing funding models. Innovators were felt to be swimming against the tide.

- Health insurers face the added complexity of a model of risk equalisation that prevents them from fully realising the savings from their preventative efforts with members (part of the cost saving effectively being redistributed to the broader pool of health insurers).
- **poor incentives for mitigation and early intervention** — Publicly funded programs do not always embed an ‘insurance mindset’ (e.g. a strong discipline on reducing long-term costs and getting better outcomes through early intervention)¹⁰. Some options have been tried — actuarial assessments of long-term cost, the New Zealand investment approach, or social impact bonds in Australian states.
 - In mental health, the overlap between life insurance and workers compensation can create confusion and inefficiency. In some cases, it has meant early intervention options are lost while claims are processed (possibly contested) through one scheme or the other.
 - In general insurance, there have long been calls for greater investment in upfront mitigation rather than disaster relief after the event. The Government's Disaster Ready Fund is a good example of a renewed emphasis on prevention.

The review could bring into play insurance concepts that tend to be misunderstood or de-emphasised in many policy settings, like moral hazard, adverse selection, risk management and the respective roles of pooled vs self-insurance options.

In the near term, some smaller steps could be taken to improve aspects of the system and unlock productivity gains (outlined in reform directive 17).

Using regtech to improve technology diffusion and lower regulatory costs

Regulation underpins important social, environmental and safety outcomes, but comes with a compliance burden on businesses and individuals and can sometimes be a barrier to investment and other economic activity.

It is important that policy makers continue to focus on sound regulatory principles, including rigorous and transparent appraisal of new proposals and a strong focus on regulator capability and culture. Technology is also opening up new opportunities to improve regulation and ease compliance costs through the use of regulatory technology (regtech).

Regtech is the innovative use of technology to better achieve regulatory objectives. Regtech can lower the administrative and compliance burden for businesses and government and improve the quality of regulation design and implementation.

Governments can support regtech adoption by presenting new regulations in forms amenable to regtech solutions; for example, by making legislation machine-readable (the New South Wales Government's *Community Gaming Regulation 2020* is a recent example).

Moreover, governments can also work with software providers to find ways to encourage industry to design regtech compliant solutions (reform directive 24). One example where this has happened is the Fair Work Commission's efforts to develop an application programming interface that enables software providers to directly access data on wages and entitlements from its Modern Awards Pay Database.

¹⁰ The PC's inquiry into the veterans support system, *A Better Way to Support Veterans*, showed that it was complex, unresponsive and too inflexible to achieve genuine long-term outcomes for clients. Similar characteristics could be observed in the disability sector prior to the National Disability Insurance Scheme.

A better approach to location and mobility

The transformative effect of communications technology is evident in the dramatic rise of remote work since the beginning of the COVID-19 pandemic. It is probable that levels of remote work will be permanently higher than 2019 levels, with businesses experimenting with variations on hybrid (or fully remote) models for a segment of the workforce.

This could prompt some job switching as employees seek employers better matched to their preferences (and vice versa). While businesses and individuals will make their own assessments about the relative productivity of working centrally or at home (at least some of the time) there is no strong policy case for government to try and influence those decisions on economic grounds.

But the increase in remote work, along with the rise of e-commerce, telehealth and remote learning are softening the nexus between economic activity and location. Planning and zoning systems that have entrenched clear distinctions between residential, retail and office uses — and between industrial and other commercial uses — should be made more flexible. Online retail is blurring the distinction between the shop and the warehouse, just as remote work blurs the distinction between the home and the office.

Planning systems based on detailed rules about what economic activity can occur where, should be reformed to free up locational decisions. This would support competition and new investment (reform directive 18).

Planning and zoning reform to improve access and lower costs

While some progress has been made to improve planning and zoning across all jurisdictions, further improvements should be prioritised.

Reforms to planning and zoning laws in Victoria in 2013 and 2018 are a good example of successful reform that is broadly enabling to business: There are now a small number of commercial and industrial zone categories; the zones are standardised and have a broad range of allowable uses; and many commercial uses are as-of-right. The Queensland planning system also has a flexible model to bringing applications into the assessment stream (rather than requiring costly and time-consuming rezoning processes).

These approaches can reduce business set-up costs and increase the availability of suitable sites for particular activities (such as small-scale supermarkets and large format retailers).

In addition, planning and zoning reform should pursue administrative efficiencies, including by aligning plans at different levels of government; and addressing simpler applications outside of the assessment process. Key reform areas relevant to competition include:

- **moving to fewer zones with broadly-stated allowable and as-of-right uses.** There should be a small number of commercial and industrial zones — with a wide range of allowable uses — which would provide flexibility, certainty, and competition, and limit the need for significant spot rezonings that would otherwise delay and/or make more costly business establishment. Prohibited uses should be kept to a minimum, with most uses 'as-of-right'
- **standardising permissible land uses within zone types.** Zone definitions should be as consistent as possible across municipalities and embedded in state government instruments to provide clarity and certainty as to allowable land uses
- **creating defined and efficient processes for rezoning applications.** To the extent that rezoning or planning scheme amendments are required to progress a development proposal, states should ensure there is a transparent process for applicants to pursue, with expected timeframes, criteria and appeal rights (reform directive 18).

Governments can also ease other restrictions on the location of specific businesses.

Regulations on location and ownership of Australia's pharmacies have reduced competition in local markets — there are now fewer pharmacies per head of population than when the regulations were introduced — and have facilitated the establishment of local monopolies — four pharmacy operators control 73% of the market share (through franchising and the like). Australian governments should follow the lead of the United Kingdom and the United States where pharmacy colocation — for example, pharmacies located in supermarkets — is allowed.

Other sectors where the Government has a large regulatory footprint should similarly and subsequently be examined to remove those impediments to competitive pressures that are not clearly supporting a broader social or environmental policy objective (reform directive 19).

Using efficient pricing to fund transport infrastructure and ease congestion

As location becomes more contestable, there is a strong case to 'price' mobility more accurately.

Reforming the pricing of road use and mass transit would bring potentially significant productivity benefits. The motor car, freeway and electric train were the large-scale technological innovations in 20th century mobility — solutions based in manufacturing and engineering. Digitally-enabled pricing and service design are the technological opportunities of today.

Digital solutions and improved data availability have made it possible to move beyond average prices like the fuel excise, or simple fare structures based on paper tickets or first-generation card technology. It is becoming possible to set prices closer to social marginal cost, opening up incentives for new mobility solutions to emerge.

Road congestion in Australian cities imposed costs of about \$24 billion in 2018-19. While road users are subject to an array of charges, few are well targeted at relieving congestion (i.e. rationing demand for scarce transport infrastructure).

Investment in and planning for new roads, and maintenance of existing ones is slower when compared with other modes of transport, and with disruptive technologies such as electric vehicles growing in popularity — resulting in a decline in the relevance of fuel-based charges — there is a greater need (as well as an opportunity) to get road-pricing right.

To achieve more efficient road user pricing, Australia governments could move towards a pricing framework that better reflects the costs imposed on the road system by users, recognising too that electrification of the vehicle fleet will undermine the revenue collected through fuel excise taxes. This would take time and many small steps.

Eventually, the pricing framework would ideally have two components: a charge based on distance travelled and a higher congestion price for certain locations and times. This would lead to more efficient use of existing infrastructure (including for maintaining and repairing existing roads), and demand-based forecasts based on prices that reflect efficient use would also help guide efficient levels of investment in new infrastructure.




Public transport fare setting in most jurisdictions similarly suffers from policy inertia. Most jurisdictions use simple and ad hoc approaches to setting fares and subsidies that do not systematically address equity or efficiency goals. A large downside risk associated with the current pricing model is that public transport services raise very little revenue from fares and rely on substantial public subsidy. Those subsidies must be raised through the tax system (which comes with an efficiency cost) and their overall impact is not always progressive, as many high income commuters are subsidised. Service quality is one of the biggest drivers of value, and hence usage, for customers, but it can suffer when public subsidies are primarily geared toward lower fares.

Independent fare regulators can help overcome these issues. A superior approach to pricing developed by the Independent Pricing and Regulatory Tribunal has been operational in New South Wales for some years,

while Infrastructure Victoria has undertaken considerable research on pricing reforms, though this is not yet reflected in policy.

State and territory governments should adopt better practice public transport pricing, including by drawing on the existing experience and policy work undertaken in their own, or other jurisdictions. This could include implementing in Victoria, Infrastructure Victoria’s reform directives on pricing, and more widespread adoption of the NSW pricing approach developed by the Independent Pricing and Regulatory Tribunal. States and territories without independent bodies to make jurisdiction-specific recommendations could also improve fare setting through other channels, such as publishing pricing strategies and rationales for decisions, and annually increasing fares in line with inflation in public transport costs (reform directive 18).

Lifting productivity in the non-market sector

	Overcome barriers in order to increase innovation and diffusion in government-funded services
	Embrace technology and remove overly restrictive regulation to speed up productivity in labour-intensive non-market services
	Improve Australia’s healthcare system to improve well-being, engagement and labour market outcomes

The ‘non-market’ moniker is something of a misnomer. It is not the case that non-market services are never delivered in a market. Rather as discussed above, the key point is that they are typically provided free of charge, or at prices that are well below cost.

Some non-market services are funded and directly delivered by government entities. Others are part-funded by government but delivered by private businesses or not-for-profits under a broad range of funding models and regulatory settings.

The rapidly expanding non-market sector, where productivity growth is slow — which will increasingly weigh on Australia’s overall productivity growth rate — presents a challenge for Governments. They need to encourage innovation and diffusion of new and better ways of doing things in the services they provide or subsidise, with the aim of producing better quality and more accessible services at lower costs. This task will not be straightforward.

The systems within which non-market services are delivered are often highly complex. This complexity, and the heterogeneity across the non-market sector, means productivity policy in the non-market sector is context-dependent, painstaking, and incremental.

The complexity of incentives has meant that while some past attempts to inject competition and market disciplines into government services have been effective, other attempts have failed. Market design is critical, but hard. Seemingly small weaknesses in the incentive structure can have large adverse and distorting effects on outcomes.

In principle, productivity in the non-market sector comes from the same basic drivers that exist in other parts of the economy: using labour more efficiently and complementing it with technology and innovating models of service delivery.

What differs is that the outcome being sought is public value, or a social purpose, rather than measurable increases in output.

And the structure of service delivery systems makes the path to productivity growth different. Diffusion channels like business entry and exit are less prevalent, price competition is muted, and there is less ability to expand market share through innovation. Many labour-intensive government services are hard to automate. The respective roles of workers with different qualification levels can be highly contested.

Where there is a separation between the party paying for the service (government or an insurer) and the service recipient, incentives for cost containment and quality improvement can be lessened.

Quality can be very hard to measure. This often results in government stepping in to regulate aspects of the services they fund, sometimes to mandate inputs as a proxy for service quality.

None of these issues is easily solved. Reform can focus in three main areas.

The first is to keep refining and adjusting funding models that encourage the delivery of more effective (hence higher productivity) services — addressing parallel issues such as scope of practice constraints will also be necessary.

The second is to actively create and support an eco-system of best practice innovation and diffusion in respect of key non-market services — such as the more effective management of chronic disease reducing hospital visits.

The third is to seek out opportunities for labour-saving technology in the most traditionally labour-intensive service sub-sectors, backed by more outcomes-based quality regulation — such as use of clinician supported online mental healthcare services.

A particular area of focus in this report, where governments and the community could benefit from the application of this three-tiered approach, is in the health and care sectors. Every year, significant amounts of taxpayer funds are used to subsidise medical procedures where the evidence base shows there is limited efficacy for improving patient outcomes, while the diffusion of demonstrated innovations in providing better care is too slow.

More flexibility in allocating government funding

Productivity in the non-market sector can be supported through more flexible approaches, or blended, funding models.

A common problem with existing models is that they tend to encourage quantity solutions — or activity — rather than quality. For example, fee for service models can reward inputs rather than outcomes. Capitation models can create incentives to reduce service levels. Quality and outcomes are hard to measure and hence reward. Australia has the added complication of Commonwealth-State overlap, where different funding models interact poorly or undermine system coherence (such as social housing and Commonwealth Rent Assistance) (reform directive 23).

Because there is no such thing as a perfect funding model, the status quo tends to persist. Conscious effort is required to adapt or reform entrenched funding or service delivery models.

Health is an example of where funding models have rewarded activity — through explicit activity-based funding in the acute hospital system and fee for service funding in the primary care system. This can create barriers to productivity growth because it locks in a particular amount of labour input (e.g. funding a 30 minute one-on-one consultation).

In some cases, the solution will be more blended models, combining elements of fee for service with capitation (per person) amounts. This has promise in primary care for the treatment of chronic conditions and could allow for some flexibility about labour input (the total and the split between different occupational groups) and the use of technology.

In other cases, the use of flexible funding pools to substitute for a portion of activity-based funding can unlock innovation and alternative service models.

Often in the non-market sector, productivity growth (similar outcomes for less input) is advanced by finding and funding lower cost settings to provide a service, such as community-based health as a substitute for acute care, or a range of alternatives to prison incarceration as a means to achieve community safety.

The rise of impact investing, 'payment by results', and social impact bonds are providing alternatives to traditional funding and delivery methods. These can sharpen incentives to produce higher quality outcomes, encourage co-ordination between different service elements (notoriously hard in government) and by creating a growing knowledge base about 'what works'. But specifying the outcomes, and the baseline against which to reward them, is complex.

There are some areas where governments can move toward 'client-centred' funding approaches in human services, so long as incentives and safeguards for cost containment and quality are strong. Under such models, clients are given control of funds to purchase services from providers of their choice, promoting innovation and diffusion, and ensuring that clients get the services that best meet their specific requirements. Providers compete to attract clients, promoting the development and uptake of new innovations (reform directive 23).

In other cases, the direction of reform is to move towards more relational contracting. In many instances, increasing the minimum length of contracts to 5–7 years for community organisations delivering health and human services would enable greater development of expertise and provide the certainty and stability needed to invest in innovation. And better use of alliance contracting or collaborative contracting for major public infrastructure projects would mean contractors with greater technical expertise and knowledge would be involved earlier in the planning and scoping stages of a project, increasing the opportunity for innovative approaches to project delivery (reform directive 22).

These approaches reflect inherent uncertainty: it is hard to specify all relevant future contingencies in an up-front funding contract. A shared approach is a more efficient way to deal with unexpected events.

The Closing the Gap Agreement explicitly prioritises service delivery through the Aboriginal community-controlled sector, which also requires a shift in thinking away from transactional contracting for specified services and towards long-term investment, a strong sense of partnership and a centring of Aboriginal and Torres Strait Islander people in service design and delivery.

Institutions to support best practice

A key issue in the non-market sector is that the 'system' for innovation and diffusion of ideas is often patchy and incomplete. One key element is the availability and evaluation of an up-to-date evidence base.

Governments already fund many organisations to evaluate publicly-funded services and promote diffusion of best practice — including the Australian Commission on Safety and Quality in Health Care, the Australian Education Research Organisation, CSIRO and the Australian National Audit Office. But in many cases their functions and roles are too limited. Governments should expand or strengthen the roles of these existing diffusion bodies with the aim of disseminating best practice, including the elimination of practices no longer underpinned by adequate evidence (reform directive 23).

Governments can also improve benchmarking of government service delivery, both between jurisdictions and between service providers. There are currently a number of benchmarking initiatives, including the Productivity Commission's Report on Government Services, MySchool, MyHospitals, the Australian Atlas of Healthcare Variations and a number of state and territory government initiatives.

The continued growth and availability of data will create new possibilities for benchmarking, to provide richer information about how far service providers are from the best performers in their sector (reform directive 24).

Addressing productivity in labour-intensive non-market services

In many parts of the 'care sector', cost and quality improvements have come from replacing, or augmenting, labour with physical capital (e.g. hospital clerks replaced by computers) or building the human capital of the workforce (e.g. improvements in the quality of medical care in the past century as doctors have accumulated more clinical knowledge).

Some parts of the non-market sector, including disability and aged care, are highly labour intensive, involving personalised services. It can be difficult to achieve big gains in labour productivity in these parts of the economy. Nonetheless, it is important to explore and maximise the scope for the use of technology where possible.

Emerging technologies show some promise for both improving the quality of services provided, and reducing their costs. Machines may be able to automatically perform manual tasks — like lifting or cleaning patients — currently performed by carers. Likewise, using diagnostic algorithms to quickly triage clients that will require more care could mean staff can be allocated to where their need is highest (i.e. operating in line with their scope of practice).

Even now there are proven technologies that could reduce the amount of labour required to perform certain service tasks (some even relatively high skilled). The WA primary Health Alliance commissioned Practitioner Online Referral Treatment Service (PORTS) has provided several years of psychological assessment, treatment, and consultation services across the state to adults referred by their GPs at a fraction of the cost of the standard MBS-rebated therapy.

There are some potential barriers to the adoption of labour-saving technology.

There are the general barriers to government and private sector diffusion (above) and second, there are barriers governments have erected specifically — and seemingly without fully understanding the potentially large impact of unintended outcomes — in these occupations. These include innovation-inhibiting restrictions, such as minimum staff-to-client ratios that discourage consideration (let alone adoption) of labour-saving technology in the care workforce, and poorly designed activity-based funding models, which reward *outputs* rather than *outcomes* in hospitals (finding 5.11, volume 5).

These types of interventions may often exist for good reason. In government-funded human services, clients, including those who are particularly vulnerable, need assistance choosing a service or service provider where information about the quality of those providers is difficult to find. And generally, consumers have fewer incentives to properly hold providers to account as they do not face the full cost of their service. However, the benefits of regulating for quality assurance need to be balanced against the costs from dampening incentives to consider and adopt productivity-enhancing innovation.

Shifting where possible towards outcomes-based quality regulations would give service providers more flexibility to meet their obligations in the most effective and efficient way possible.

Health reform should focus on broad strategies executed across the country

In *Shifting the Dial*, the Commission homed in on the healthcare system as a key component of the policy agenda.

This reflects both the need for productivity growth within the health sector, as a large and growing share of the economy and workforce, and the impact that good health outcomes can have on productivity, participation and broader life outcomes.

In that report, the Commission noted the rigidities of existing healthcare service models: the lack of integration between parts of the system, inadequate use of data, and poor diffusion of best practice. It used

the example of the ‘waiting room’ to symbolise the lack of innovation and patient focus in the system, noting that waiting times in doctors’ offices are likely to impose costs on Australians of approximately one billion dollars annually.

While there are the systemic problems that limit the quality and efficiency of the healthcare system, the overarching goal should be changes to encourage patient-centred and integrated care. There are three concrete reform strategies that reflect the broad problems above and the policy responses most likely to alleviate them:

Funding arrangements that align with high value care

Scaling up long-term co-operative funding mechanisms that align the incentives of primary and hospital providers would help avoid costly hospital admissions and support integrated care. As noted above, innovative funding pools have helped spur innovation in health care delivery. Capitation (or blended) models and other mechanisms supported by the Independent Hospital and Aged Care Pricing Authority hold promise in removing some barriers to innovation and productivity growth (reform directive 23).

There may also be scope to expand the role of private health insurance and potentially life insurance can also unlock new reimbursement models to target preventative approaches.

Encouraging innovation, experiments and diffusion of evidence-based healthcare and administration, while eliminating waste

For example, annual reviews of selected items on the Medicare Benefits Schedule, and updating the schedule so that only treatments that reflect medical best practice are funded would represent a concrete step towards a more evidence based, efficient and patient centred system (reform directive 23). Clinical variation can reflect differences in practitioners, rather than differences in patients, and can contribute to substantial waste in the system.

The adoption of new technologies and data sharing arrangements that improve coordination in the system

As an illustration, the Mental Health inquiry, released in 2020, and the Innovations in Care for Chronic Health Conditions study, released in 2021, showed the benefits to patients from service models based even on relatively simple digital channels, data analytics and data linkages. Transforming My Health Record into a comprehensive system for sharing and using health data across all parts of the health system could significantly improve service quality for patients (reform directive 15).

These three areas for policy focus have long been aired (and indeed were canvassed in *Shifting the Dial* — the predecessor 5 yearly productivity inquiry) and are best prosecuted through a system-wide co-operative reform across all jurisdictions. The Australian Government’s Primary Health Care 10 Year Plan and parts of the National Health Reform Agreement (signed by all Australian governments) reflect a degree of momentum.

Securing net-zero at least cost



Chart the least-cost path to net zero to minimise the drag on productivity from our mitigation efforts



Adapt to the changing climate by helping individuals, households and businesses make informed adaptation decisions



Improve the reliability of electricity markets to best respond to intermittence challenges associated with increasing uptake of renewables

Climate change looms large over Australia's productivity growth.

To minimise the economic costs of decarbonisation and meet Australia's commitment to a 2050 Net Zero Emissions Target it will be important to pursue least-cost mitigation and adaptation policies across all levels of government to the greatest extent possible.

Charting the least-cost path to net zero

Investment in renewable generation is projected to rapidly decarbonise our electricity system over the next decade, which will in turn drive the decarbonisation of transport and some parts of heavy industry and heavy transport. Remaining 'harder-to-abate' sectors, such as broadacre beef production in agriculture, might be offset through the uptake of carbon sequestration measures like reforestation or carbon capture and storage. Ongoing technological development and shifting consumer preferences (e.g. in the form of artificial meat products, where demand is rapidly increasing) could also reduce demand for, and emissions from, these sectors.

While technological developments are mainly driven by international policy settings, domestic policy settings (including trade and foreign investment policies) are important in driving the application of these technologies by individuals, households and businesses in Australia. Domestic policy settings that produce enduring and consistent abatement incentives will be crucial.

To date, Australian governments have sometimes relied on mitigation measures that impose economic costs much higher than would be delivered by an explicit economy-wide carbon price. Apart from this, Australia's mitigation measures may expose Australian exporters to additional costs in the form of carbon border tariffs (i.e. where trading partners do not recognise mitigation measures other than explicit carbon prices).

Future abatement policy should apply as broadly as possible to encourage efficient, technology-neutral, least-cost abatement, including by providing a more certain capital investment environment for Australia's carbon emitters.

The foundational elements of such a mechanism already exist. Recalibrating several existing schemes, while removing those that are unnecessarily costly, would create a sustainable climate policy architecture for Australia — that is, one that provides greater certainty, clarity, and enduring support for efficient abatement decisions over the decades ahead.

To this end, the Safeguard Mechanism (SM) can be the basis for an economy-wide mechanism for achieving national abatement targets (reform directive 26).

At present, the SM seeks to limit greenhouse gas emissions by targeting Australia's largest industrial emitters. It does this by assigning emissions budgets (baselines) to facilities that produce more than 100 000 tonnes of CO₂ equivalent (CO₂-e) emissions. Emissions exceeding these budgets must be offset through the purchase of Australian Carbon Credit Units (ACCUs) created through various emissions reduction activities elsewhere in the economy.

For the SM to become an effective broad abatement mechanism, a package of changes will be required to strengthen its integrity and expand its scope.

- Baselines will need to be reset in terms of absolute emissions, not emissions intensity (emissions per unit of output). The existing emissions intensity targets allow overall emissions to increase in line with production, which could jeopardise Australia's emissions targets. Absolute emissions baselines avoid this outcome.
- With absolute emissions baselines in place, emissions reductions below these absolute emissions baselines should be tradeable with other facilities covered by the SM. This would increase the pool of

commercially viable abatement opportunities and allows the transfer of economy-wide abatement burdens to the least-cost abatement options within the SM, reducing economy-wide abatement costs.

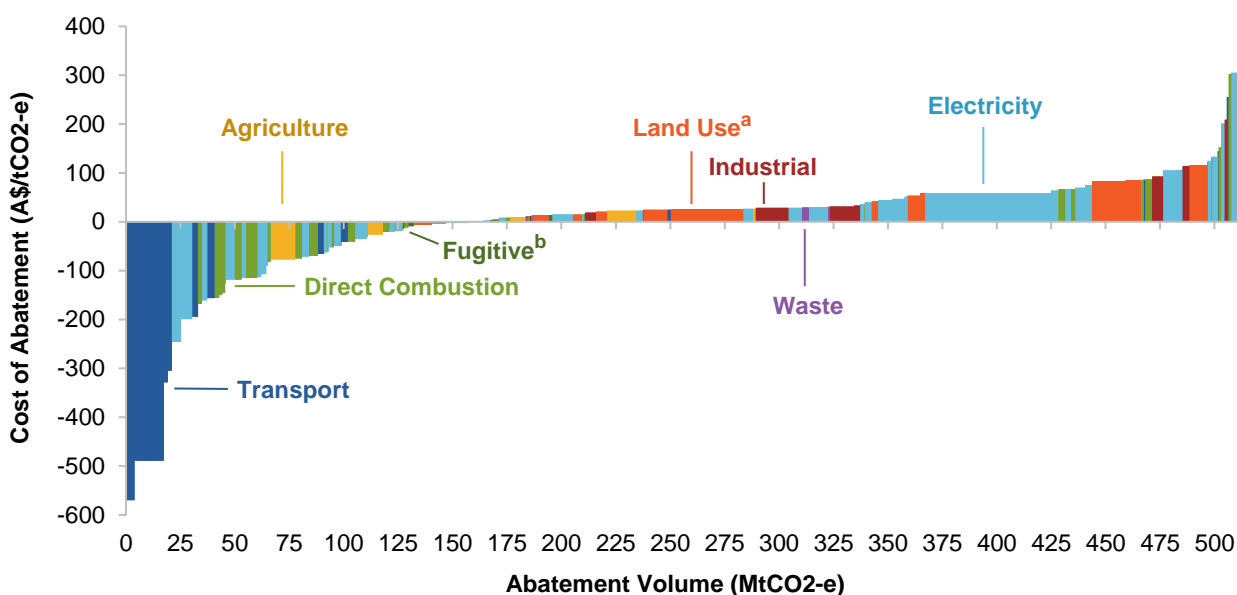
- Importantly, the SM currently only covers 27% of Australia’s greenhouse gas emissions. It should be expanded (reform directive 26).

Under existing arrangements, the electricity sector — which accounts for more than 30% of Australia’s CO₂-e emissions — is covered at a sectoral level but not at the facility level.

Apart from some large facilities such as airlines, the transport sector — which is responsible for almost 20% of emissions — is effectively exempt from any limits because most emissions come from hundreds of thousands of cars, trucks and buses that individually emit well below the threshold limit.

Expanding the SM to include the electricity sector at the facility level would increase the facility-level coverage of the SM to more than 55% of Australia’s emissions. Incorporating the transport sector, by attributing vehicle emissions to liquid fuel wholesalers, would increase the coverage of the SM to about 70% of total Australian emissions. Extending the SM to facilities emitting more than 25 000 tonnes of CO₂-e would increase coverage by another 3% to about three quarters of total emissions, creating a near comprehensive, economy-wide abatement mechanism (figure 1.12).

Figure 1.12 – The Safeguard Mechanism should cover transport and electricity
Australia’s projected marginal cost of abatement curve, 2030



a. ‘Land use’ includes land use change and forestry. b. Fugitive emissions are emissions associated with production of natural gas, oil and coal.

The degree to which the SM credibly and efficiently contributes to Australia’s emissions reduction commitments will partly depend on the integrity of the offsets recognised by the scheme. Accordingly, Australian governments should take steps to ensure the integrity of ACCU offsets recognised by the Safeguard Mechanism by tightening standards to ensure the additionality, permanence, and transparency of ACCU generating projects (reform directive 27).

With an expanded SM in place, the public policy case for additional sectoral interventions becomes much weaker. Governments should ensure that any emissions abatement policies that are not genuinely complementary to the SM — that is, they neither efficiently address non-price barriers to abatement nor deliver

broader noncarbon abatement social benefits — are phased out (reform directive 28). For example, the ongoing need for additional policy support for renewable energy generation is likely not required, and similarly, the already questionable policy case for Australian Government tax concessions for electric vehicles — which have a high cost-per-tonne of abatement — would become even more so. Extant and prospective emissions policies should have their implicit carbon prices independently estimated and made public.

Adapting to the changing climate

Most adaptation-related decisions will be made by individuals, households, and businesses. Accordingly, adaptation policy to promote productivity should focus on three main tasks: helping individuals, households and businesses make informed adaptation decisions; avoiding policy settings that inadvertently and inefficiently distort private adaptation decisions; and avoiding policy decisions that lock in higher adaptation costs in the future (reform directive 25).

To these ends, governments should implement a mandatory climate risk disclosure system for residential and commercial property sales to help buyers understand the climate-related risks they face. Governments should avoid expansion of distortionary insurance sector interventions and set a medium-term time frame for the phase out of those that exist already. In addition, decisions about the location of new greenfield developments, and the reconstruction of population centres impacted by natural disasters should be subjected to rigorous cost-benefit analysis that draws on existing climate projections and considers the broad range of social, environmental, and economic costs and benefits of available options.

Improving the reliability of electricity markets

Intermittence associated with growing renewable energy uptake (which arises from variation in the availability of solar and wind generated electricity over the course of the day) poses reliability questions for Australia's electricity grid. Australian, State and Territory governments have recently announced plans to implement a capacity investment scheme to effectively pay suppliers of dispatchable electricity to make that supply available during periods of grid instability, helping to increase the likelihood that adequate supplies will be available when needed.

The implementation of the scheme would mark a move away from Australia's current approach to grid stability, which largely relies on movements in wholesale electricity prices to bring supply and demand into alignment.

To support productivity growth, the capacity investment scheme should be designed to respond to intermittence at least cost. Promoting a more technology-neutral approach, by allowing for both supply and demand side participation in the scheme, from both large entities and smaller entities (aggregated and coordinated through 'virtual power plant' platforms), would be an important step in this direction. The scheme should be reassessed in 5 years (via the inclusion of a sunset clause) to ensure the ongoing costs to businesses and households of maintaining the scheme are justified (reform directive 29).

1.4 The shared benefits of a productivity agenda

Across nations, there is a strong correlation between average incomes, life expectancy and life satisfaction, and reductions in absolute levels of poverty: not just because high incomes can fund better services and benefits; but also because they share a common proponent — a system that constantly promotes new ways to get more (and better) from less, to improve everyday life.

But what about the relative gains? Are the benefits evenly shared across the community?

These distributional questions cannot be dismissed. Past economic reforms — particularly where entire industries have been restructured — have often delivered benefits to many, but with losses concentrated in particular regions or demographic groups. This is more problematic when the losses hit those with already low incomes, wealth or educational qualifications.

Even at a smaller scale, economic change creates losses as well as gains. If consumers vote with their feet and a less productive business loses market share to a more productive one; or if it exits the industry altogether, individuals can suffer a loss of income and the jolt of forced transition, even though many consumers are better off. Governments play a key role supporting such adjustments and protecting people in need of help.

To this end, this report notes the role of government as an insurer against the risks people face throughout their lives through the provision of in-kind services like health and disability care, and transfer payments. Much of this insurance works well, but there are gaps and complex interactions with other privately-managed forms of insurance — with potentially adverse economic and social outcomes. Having government think more explicitly with an insurance mindset would be a significant, generational reform journey for Australia. This report makes some recommendations to start that reform process.

When overall risk protection is robust, policy makers can have more confidence about the disruptions that can come with policy change, or in a dynamic economy in general.

Potential distributional effects of proposed reform directions

A qualitative assessment, and the Commission's own modelling, suggests that the package of recommendations detailed here would increase opportunity and improve outcomes for some key disadvantaged groups.¹¹

Many of the reform directions are directly focused on reducing barriers, improving incentives and spreading the benefits of productivity growth more broadly. Driving innovation and diffusion in the non-market sector is aimed at improving services — typically delivered to the general community or to particular groups in need of support. Even where there is scope for labour-saving technology in government-funded services, this is likely to be in the context of substantial growth in overall employment in areas like the caring sector. Some cost reduction would make services more affordable to government, while quality improvement is of benefit to service users.

Improving productivity in the school system is one of the most effective ways to boost equality of opportunity and improve economic and social mobility within and between generations. Thus, the proposed school reforms outlined in this report are likely to be progressive in their overall impact. The spread of technology in schools and evidence-based course materials to teachers can not only lift teaching quality, but make it less unequal. This has potential to lift outcomes among students at risk of falling behind, and those who suffer from variable teaching and school quality.

Tertiary education reforms primarily expand access to income contingent loans for a broader range of VET students, and additional university places under a reformed demand-driven system. Experience under the

¹¹ The Commission used a purpose-built model to illustrate the whole-of-economy effects of stylised representations for some proposed reforms. The model provides insights on:

- how productivity improvements can flow through the economy's structure, and what the changes are in underlying economic variables that are driving overall movements in aggregate outputs such as GDP, gross national income, prices, wages and use of labour measures relating to the impact of reforms on consumer wellbeing (in monetary terms, for example, equivalent variation) and inequality (for example, the Gini coefficient)
- the differential impacts of reforms across various groups in the economy, at both the individual level (by age, education and gender groups) and the business level (by industry).

demand driven funding arrangements in place between 2012 and 2018 suggests that these reforms would disproportionately benefit lower income students and other equity groups, whose share of the student population experienced a major expansion.

To make that package fiscally neutral, it is recommended that some students make a greater contribution to the cost of their study, through the income contingent loan system. This would effectively bring the student contribution more into line with the private benefits that flow to graduates over their working lives — paid at a time when their future income exceeds the repayment threshold.

Lifelong learning needs careful design. Those most likely to pursue it tend to have a strong learning foundation — including those who have completed higher qualifications. That does not negate the case for fostering a culture of lifelong learning. There are productivity gains and spillover benefits from encouraging up-skilling and re-skilling throughout working lives. But particular focus could be given to broadening the uptake of ongoing training, including to those disconnected from the workforce or at risk of being so.

The proposed migration reforms aim to focus the program more on higher income migrants, to maximise the spillover and productivity benefits. Moving away from the inefficiency of skilled occupation lists could mean that some domestic workers who earn more than the proposed income threshold could face more competition. Local workers below the threshold could face less competition. The impact on the wage distribution is likely small, but more likely to reduce it.

Workplace relations reforms seek to improve the scope for flexibility within the architecture of regulated protections. As Volume 2 notes, productivity growth is not about employees working longer hours, or having their pay reduced. In fact, past productivity growth has resulted in higher wages and fewer hours worked per capita. Low aggregate productivity growth makes the 4-day working week less feasible and therefore less likely. There could be significant gains to workers through better award compliance due to regtech solutions (and simpler rules).

A fit for purpose regulatory approach to platform work can deliver important protections in respect of safety, insurance and dispute resolution. At the same time, it can preserve the choice and flexibility that workers and consumers have gained from this innovation, benefiting a cross-section of the community.

Refocusing innovation policy on diffusion — the 98% — is an effort to more fully democratise innovation. The policy measures recommended here are a suite of small changes, all aimed at helping ideas to spread more efficiently across the economy. But the successful uptake of new ideas — including digital technology or the more sophisticated use of data — will inevitably be patchy. For example, Productivity Commission research into cloud computing suggests that some businesses will use technology to great effect, while others will fail to adopt, and still others will adopt but fail to achieve much benefit.

Governments can improve the process of efficient adoption by working with business networks and providing benchmarking data. But as long as there is nothing systematic about which businesses succeed with technology and which do not, the distributional effects should be seen as a necessary reality underpinning a dynamic economy. Ensuring there are no undue impediments to labour (and capital) mobility and that there is a robust safety net in place, are the best solutions.

High quality and efficiently provided regional and remote digital infrastructure helps overcome one source of systematic differential performance among businesses. It will also reduce geographic variation in the quality of delivery of telecommunications services for consumers.

Some recommendations involve changes to pricing, such as an evolutionary shift towards road user charging and ongoing reform of the pricing of public transport.

A key consideration is that road use is currently 'priced' via a general fuel excise charged per litre of fuel. The fact that electric vehicles pay no excise raises distributional issues.

The Commission's past work on public transport pricing highlights similar distributional complexities. Commuters on major city train networks traveling into the central business district tend to have above average incomes. They benefit from substantial public subsidies not enjoyed by those (including low-income households) with less public transport access. While a high public subsidies is inevitable in most public transport systems, there is considerable scope to design fares to achieve better efficiency and equity.

Perhaps the most challenging distributional issue concerns the climate transition. The distributional costs and benefits of both mitigation and adaptation span generations. Achieving the successful decarbonisation of the Australian economy will involve a structural change for affected industries and regions. The recommendations in this report focus on using the safeguard mechanism to foster a more orderly, lower cost and predictable transition. Focusing on achieving net-zero at least cost, by promoting higher productivity growth than otherwise, will also enhance the capacity to provide adjustment assistance, including to lessen inequitable distributional impacts.

Overall, while thoughtful, and often gradual, implementation is needed, there is no strong case on equity grounds against pro-productivity reforms of the type outlined in this report. Quite the contrary. A key message of this report is that we can broaden our thinking about productivity — both its effects (quality, novelty, things not measured by GDP) and where it can apply (services and the government sector).

The impact of productivity growth — properly and broadly understood — is progress in multiple domains, multiple facets of life and with benefits spreading across the community.

2. Roadmap

The Commission's policy agenda includes 71 recommendations that collectively would enable productivity growth across the Australian economy. These recommendations are packaged together into 29 reform directives. Generally, the reform directives capture what governments should do; the recommendations tell them how to do it. These reform directives are the enablers of productivity growth that fit under the five themes outlined in section 1.3.

To help direct government resources toward implementation, the Commission has developed a roadmap to reflect a possible prioritisation. The prioritised reform directives are laid out in section 2.2. The roadmap also contains a collection of implementation plans (section 2.3). These plans provide more detail on how governments would go about implementing the highest priority reform directives.

2.1 The prioritisation framework

Prioritisation of reform directives is not an exact science. To keep things simple, they are prioritised using two criteria.

The first criterion is **expected productivity impact**.

Reform directives were sorted into two broad groups according to their expected impact on productivity: higher impact and lower impact. In grouping reforms, factors considered included:

- the number of affected parties (e.g. people, employees and businesses)
- the costs and benefits for those parties
- whether the reform results in a one-off 'step-change' to productivity or has an on-going effect on productivity growth rates
- the extent of additionality from the reform (that is, the difference between what we would expect to happen with and without implementing the reform).

Where appropriate, prioritisation drew on modelling presented in volume 9. This was only feasible for a subset of reform directives. For others, partial assessment of costs and benefits were estimated and/or qualitative assessments were made drawing on information from inquiry participants and other Commission research.

Generally, reform directives that affect many parties, have relatively large additional effects, or result in an increase in the productivity growth rate were deemed higher impact. Reform directives that affected less parties (unless the effects were particularly concentrated on those parties), had little additionality, or resulted in a smaller step-change were deemed lower impact.

The second criterion is **complexity**.

Reform directives were sorted into two broad groups reflecting their expected complexity to implement: complex and simple. Again, a range of factors were used to assess reform directives, including:

- whether the reform requires coordination between government agencies (whether between or across levels of government)
- whether the reform requires more involved processes (like changes to legislation as opposed to regulatory changes)
- uncertainty — a reform whose outcomes we are less confident in, is more complex.¹²

Generally, reform directives that require greater coordination, require more involved processes, and have higher degrees of uncertainty are deemed complex. Reform directives that require limited coordination, require less involved processes (e.g. just regulatory change) and have more certain outcomes were deemed simple.

The goal of prioritisation is to help direct public resources toward the highest value measures first. Using the above criteria, the reforms were divided into three different priority levels:

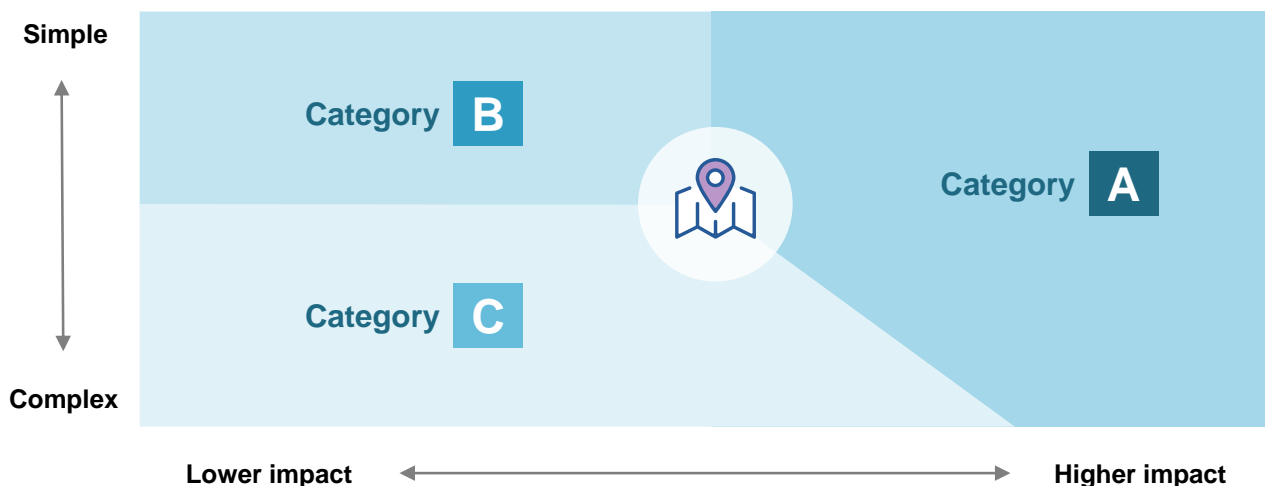
Category A: These reforms are higher impact and either simple or complex. While some of these recommendations are more complex than others, their higher impact means they should nonetheless all be top priorities in the pursuit of productivity growth. If government were to implement only one group of policies, this group should be their choice.

Category B: These reforms have a lower productivity impact but are simple. While individually lower impact than Category A recommendations, they would have a significant cumulative effect if implemented. And because they are simple, governments will face relatively few hurdles in their implementation.

Category C: These reforms are more complex to implement and their productivity impact could vary depending on the scale at which they are implemented. They include reform directives such as a more efficient tax system or long-term reform of Australia’s insurance arrangements — both of which could involve small, short-term steps and/or more far-reaching, long-term change. This puts them in a distinct category.

Figure 2.1 provides a visual representation of the framework.

Figure 2.1 – Prioritisation framework



¹² Uncertainty may reflect the state of existing evidence, the potential for unintended side-effects, or dependence on other things happening first (like technological change).

2.2 The prioritised reforms

Table 2.1 contains the prioritised reform directives. Reform directives are organised under the five key enablers of productivity growth in the policy agenda.

Timing the policy agenda

Prioritisation suggests that, given limited time and resources, governments should focus on implementing Category A reform directives, then B. But they should also consider initial steps towards implementation of Category C reforms.

In almost all cases Governments could make some progress implementing all of the reforms so that the potential productivity benefits could be realised as quickly as possible. Some reform directives, and their associated recommendations, would take longer than others to implement due to differing degrees of complexity.

Opportunities to coordinate implementation across governments

Reflecting the very broad nature of the reform directives in the outlined policy agenda, action by all Australian governments will be needed to position Australia for future productivity growth. Some of these reforms will require coordination across governments, others can be implemented unilaterally. Examples are provided below.

Australian Government reforms

The Australian Government can implement some reforms by itself. For example, elevating the Safeguard Mechanism to be Australia's primary emissions abatement mechanism would promote productivity and be progressively achieved with little delay. Charging the Office of Supply Chain Resilience to assess the economy-wide net benefits of all calls for assistance in supply chains, with transparent reporting of any interventions, could similarly be implemented promptly by the Australian Government for immediate benefits. The use of government-held data to help businesses benchmark their performance and provide insights that promote diffusion of best practice is an approach already adopted by some Australian Government agencies. It could be extended more broadly for the benefit of both the relevant businesses and the decision-making capacity of the states and territories in which they are located. Reforms to migration policy is entirely an Australian Government responsibility, though consultation with state and territory governments would be an important element.

State and territory government reforms

Other reforms are in policy areas where the states and territories have primary responsibility for program delivery or funding. These include: revision of planning regulations to ensure residential, commercial and industrial zoning is not unduly restrictive, various state taxes, public transport pricing, and trialing innovative approaches to schooling.

In these instances, jurisdictions should consider a staged approach to implementation that reflects their starting points for reforms and priorities within their jurisdiction. For example, some states have more developed planning and zoning reforms, have already commenced the shift away from stamp duty on the sale of dwellings, and have better processes for public transport pricing. All jurisdictions should share the lessons from their reforms.

Reforms for multiple levels of government

Actions by multiple levels of government will sometimes be needed for some reforms, or at least to yield all their benefits. In some instances, a nationally negotiated approach to implementation would lead to the most

beneficial outcome for some state- and territory-based reforms. For example, we have recommended that teaching resources be developed centrally to support schools in the implementation of the national curriculum.

Similarly, the Commission has recommended further progression in the sharing of government-held data. Some of this data is held by the Australian Government and expanding access to state and territory governments would improve the efficiency and delivery of their services.

The introduction of income-contingent loans for VET students would require action by the Australian Government as administration of income contingent loans is undertaken through the Australian Taxation Office. There would also necessarily be associated changes for each state and territory government to consider in existing VET funding and in enabling VET providers on the ground to cater for any expanded interest in VET courses that could be expected to come with the augmented availability of income contingent loans.




Coordinated action is already recognized as an essential aspect of healthcare reform, with widespread changes needed to bring together the funding of, and interfaces between, primary and hospital care. This is likely to shift the responsibilities of governments.



There are some recommended reforms for which implementation would need to be preceded by detailed negotiation between the Australian, state and territory governments. This is typically the case in areas where states and territories have a substantial role in implementation or where there is considerable variation in existing arrangements between states and territories. Healthcare reform also fits in this category.

There has already been considerable progress in mutual recognition of occupational licenses between states and territories. The Commission has recommended that this process continue to allow default recognition of occupational licenses from partner countries and coordination of these with skilled migration requirements. As was the case in achieving mutual recognition of licenses between states and territories, further negotiation and coordination between jurisdictions would be necessary to expand mutual recognition to occupational licensing in other countries. The Australian Government could play a facilitating role in such negotiations.

Reform to road user pricing and funding will require the phasing out of fuel excise (collected by the Australian Government) and the introduction of distance-based pricing and ultimately congestion charges. These reforms will need close coordination and mechanisms to diffuse the lessons of various road pricing trials and road funds between jurisdictions. This would best be implemented via an intergovernmental agreement to define roles, responsibilities, funding models and timing. Changes to heavy vehicle pricing could occur outside these processes.

Table 2.1 – Prioritised reform directives

	Category A	Category B	Category C
Building an adaptable workforce 	<ul style="list-style-type: none"> • Improve workplace outcomes and ensure a fair sharing of the gains from productivity improvements (RD. 11) • Occupation licensing regimes that are fit-for-purpose (RD. 10) • Improve occupational licensing arrangements to reduce barriers faced by skilled migrants (RD. 9) • A better targeted skilled migration system (RD. 8) • Grow access to tertiary education (RD. 3) • Improve schools' capacity to lay the educational foundations for the future workforce (RD. 1) 	<ul style="list-style-type: none"> • Support a culture of lifelong learning for an agile workforce (RD. 4) • Increase tertiary education teaching quality to underpin a well-trained workforce (RD. 5) • Better and more flexible matching between students and work opportunities (RD. 6) • VET reform that supports an adaptive workforce (RD. 7) 	<ul style="list-style-type: none"> • Enable innovative schooling approaches for improved learning outcomes (RD. 2) • Regulation that works with new workforce models (RD. 12)
Harnessing data, digital technology and diffusion 	<ul style="list-style-type: none"> • Maximise the value of government-collected or funded data holdings (RD. 15) 	<ul style="list-style-type: none"> • Faster and more reliable internet access to underpin productivity growth in regional Australia (RD. 13) • Actively promote the diffusion of new knowledge and best practice across the business community (RD. 16) • Cyber security compliance arrangements to underpin a productive digital economy (RD. 14) 	
Creating a more dynamic economy 	<ul style="list-style-type: none"> • Create an investment environment that allows the right activities to occur in the right places (RD. 18) • Pursue economic resilience through open trade and foreign investment (RD. 21) 	<ul style="list-style-type: none"> • Address lack of competitive market incentives in highly regulated sectors (RD. 19) 	<ul style="list-style-type: none"> • Create a risk protection system that encourages entrepreneurship and a long-term view (RD. 17) • Transition tax system incentives to invigorate productivity growth (RD. 20)

	Category A	Category B	Category C
<p>Lifting productivity in the non-market sector</p> 	<ul style="list-style-type: none"> • Implement best practice resource allocation when funding public infrastructure (RD. 22) • Using health funding approaches to diffuse innovations (RD. 23) 		<ul style="list-style-type: none"> • Promote innovation and diffusion within government agencies and regulators (RD. 24)
<p>Securing net zero and adapting to a changing climate at least cost</p> 	<ul style="list-style-type: none"> • Create policy settings that enable and respect private adaptation decisions (RD. 25) • Elevate the Safeguard Mechanism to be Australia's primary emissions abatement mechanism (RD. 26) • Increase the integrity of carbon offsets (RD. 27) • Remove emission reduction measures that are not complementary to the Safeguard Mechanism (RD. 28) • Pursue a least-cost approach to securing electricity supply (RD. 29) 		

2.3 Implementation plans

Implementation plans for all Category A reform directives are shown below. The aim of these plans is to provide key information at-a-glance about the ‘what’, ‘how’ and ‘who’ of each reform directive. The ‘why’ of the reform directives are contained in the relevant volume along with additional details. The structure of each 1-pager includes:

- a statement of the nature of the reform directive
- the productivity profile of the reform directive — including the expected productivity impact (higher or lower) and when those impacts are likely to eventuate (short, medium or long term)
- actions that governments need to undertake to implement the recommendations under the reform directive (including which level, and in some cases which agency and/or level of government)
- a description of the level of complexity (higher or lower) involved in implementing the reform directive (such as the need to alter legislation or to engage in extensive consultation).

The reform directives and their associated recommendations are listed in table 2.2.

Table 2.2 – Mapping reform directives to recommendations

Reform directives		Recommendations	Implementation plan
Building an adaptable workforce			
1	Improve schools' capacity to lay the educational foundations for the future workforce (Volume 8)	8.1 – 8.2	✓
2	Enable innovative schooling approaches for improved learning outcomes (Volume 8)	8.3	
3	Grow access to tertiary education (Volume 8)	8.4 – 8.7	✓
4	Support a culture of lifelong learning for an agile workforce (Volume 8)	8.8	
5	Increase tertiary education teaching quality to underpin a well-trained workforce (Volume 8)	8.9 – 8.12	
6	Better and more flexible matching between students and work opportunities (Volume 8)	8.13 – 8.14	
7	VET reform that supports an adaptive workforce (Volume 8)	8.15 – 8.16	
8	A better targeted skilled migration system (Volume 7)	7.1 – 7.6	✓
9	Improve occupational licensing arrangements to reduce barriers faced by skilled migrants (Volume 7)	7.7 – 7.8	✓
10	Occupational licensing regimes that are fit-for-purpose (Volume 7)	7.9 – 7.12	✓
11	Improve workplace outcomes and ensure a fair sharing of the gains from productivity improvements (Volume 7)	7.13 – 7.17	✓
12	Regulation that works with new workforce models (Volume 7)	7.18 – 7.19	
Harnessing data, digital technology and diffusion			
13	Faster and more reliable internet access to underpin productivity growth in regional Australia (Volume 4)	4.1	
14	Cyber security compliance arrangements to underpin a productive digital economy (Volume 4)	4.5	
15	Maximise the value of government-collected or funded data holdings (Volume 4)	4.2 – 4.4	✓
16	Actively promote the diffusion of new knowledge and best practice across the business community (Volume 5)	5.1 – 5.5, 5.13	

Reform directives		Recommendations	Implementation plan
Creating a more dynamic economy			
17	Create a risk protection system that encourages entrepreneurship and a long-term view (Volume 3)	3.1	
18	Create an investment environment that allows the right activities to occur in the right places (Volume 3)	3.2, 3.5 – 3.6	✓
19	Address lack of competitive market incentives in highly regulated sectors (Volume 3)	3.3	
20	Transition tax system incentives to invigorate productivity growth (Volume 3)	3.4	
21	Pursue economic resilience through open trade and foreign investment (Volume 3)	3.7 – 3.10	✓
Lifting productivity in the non-market sector			
22	Implement best practice resource allocation when funding public infrastructure (Volume 5)	5.7 – 5.8	✓
23	Using health funding approaches to diffuse innovations (Volume 5)	5.6, 5.11	✓
24	Promote innovation and diffusion within government agencies and regulators (Volume 5)	5.9 – 5.10, 5.12	
Securing net zero and adapting to a changing climate at least cost			
25	Create policy settings that enable and respect private adaptation decisions (Volume 6)	6.1 – 6.4	✓
26	Elevate the Safeguard Mechanism to be Australia's primary emissions abatement mechanism (Volume 6)	6.5	✓
27	Increase the integrity of carbon offsets (Volume 6)	6.6	✓
28	Remove emission reduction measures that are not complementary to the Safeguard Mechanism (Volume 6)	6.7	✓
29	Pursue a least-cost approach to securing electricity supply (Volume 6)	6.8	✓

REFORM DIRECTIVE 1

Improve schools' capacity to lay the educational foundations for the future workforce



Australian, State and Territory Governments should work with schools to:

- extend, improve and embed the use of education technology
- facilitate greater classroom access for the Australian Education Research Organisation (AERO) to support more principal and teacher involvement in education research and ensure research is salient and readily applicable by practitioners
- support diffusion of evidence-based teaching practices to the classroom through greater observation and feedback mechanisms, and curriculum implementation support.

The expected productivity impact of this recommendation is high, and following implementation, **the benefits would likely be realised in the longer term**. Spreading best teaching practice and effective education technologies has implications for the productivity of both the school system (that is, getting more out of the resources currently being used), and the broader economy as students who benefit from such reforms could ultimately become more active and productive members of society. While some in-school productivity improvements could occur sooner, the more important benefit to student outcomes would only be realised in the longer term.

Specific actions

- Enable teaching practices to evolve with the changing classroom environment by prioritising the development and implementation of digital tools to support teaching and learning, while balancing flexibility for individual jurisdictions' needs – this could include developing an online assessment tool and giving AERO responsibility for researching and vetting effective digital technologies.
- Replace manual school administrative processes with technology-based or automated solutions – this could include evaluating technology-based solutions for administrative processes currently in place and developing mechanisms to diffuse these to other schools.
- Continuous commitment to ongoing professional development modules that support teachers in using data analytics to drive student improvement.
- Enable greater observation of, and feedback on, classroom teaching practices, by creating or strengthening the existing roles for highly accomplished and lead teachers (HALT) to share their in-depth knowledge and skills with their colleagues.
- Increase curriculum implementation support for teachers, by curating high-quality, evidence-based and government-endorsed curriculum resources (curriculum plans, whole-subject sequences, lesson plans and classroom tools), to be made available for teachers and school leaders from a single source.

This recommendation has higher complexity. Successful implementation of these recommendations will require both individual and coordinated action by Australian, state and territory governments and engagement at the individual school level to ensure local needs and objectives are taken into account.

REFORM DIRECTIVE 3

Grow access to tertiary education



The Australian Government should adopt an improved demand-driven model for providing Commonwealth supported places to domestic undergraduate university students, subject to measures that contain fiscal costs and ensure all students are adequately supported.

This recommendation is expected to have a **high impact on productivity**, and following implementation, the **benefits would be realised in the medium term**. Greater access to higher education will benefit students and productivity. The additional students enrolled as a result of this reform will experience considerable employment benefits, and this is particularly so in the context of an anticipated spike in school leavers and continuing growth in industry need for skilled workers. Compared with the current approach to public funding of universities, demand-driven funding would also improve incentives to offer quality education and remove a distorted incentive that prevents course offerings from aligning with skill needs.

Specific actions

- The Australian Government should consult on amendments to the *Higher Education Support Act 2003* (Cth) with a view to implementing a demand-driven model for funding domestic undergraduate places.
- Several complementary measures recommended in this report will be needed to support a sustainable and effective demand-driven funding model.
 - The costs of expanding access should be contained by increasing the proportion of total course costs that are paid by students (generally through income-contingent loans).
 - Total course funding, comprising the government and student contributions, will need to be based on the cost of delivery with estimates of this cost refined over time.
 - Mechanisms to encourage better quality and improved support for completion will need to be implemented as the number and diversity of students increases over time.
 - Income-contingent loan access should be gradually expanded to more vocational education and training (VET) courses, starting at the Diploma level, to put financing arrangements between the sectors on a more equal footing so that the expansion of higher education does not come at the expense of VET.
- Where placements are required for graduates to work in their field of study, such as nursing, Australian, State and Territory Governments should ensure an adequate number of placements are available and funded to meet skill needs.
- There could be phased implementation of a demand-driven system if it appears that universities would expand places rapidly before they can adjust resourcing to cater effectively to larger cohorts. This may not be necessary if demand for university places is reduced by strong labour market conditions, as has been the case recently.

This recommendation has lower complexity. The existing Universities Accord process could be leveraged to consult on the implementation of this recommendation. Implementing a new funding model would then require the Australian Government to amend the *Higher Education Support Act 2003* (Cth).

REFORM DIRECTIVE 8

A better targeted skilled migration system



The Australian Government should amend the design of temporary and permanent skilled migration visa programs to improve the composition of the migrant intake.

The **expected productivity impact of this recommendation is higher**, and following implementation, the **benefits will likely be realised in the medium term**. While skilled migration already provides a positive productivity dividend, the Commission's suite of reforms would improve productivity and wellbeing more generally, through better job matching and lifetime fiscal outcomes of migration.

Specific actions

The Australian Government should:

- abolish the Business Innovation & Investment visa program. Temporary migration should be facilitated for people with genuine plans to start a business in Australia, while pathways to permanent residency should involve the revised Skilled Independent, based on a points test that better accounts for income levels and age
- remove current list-based restrictions for employer-sponsored temporary and permanent skilled visas and set an income threshold well above the Temporary Skilled Migration Income Threshold (TSMIT) rate. The income threshold that applies to temporary migration should be lower than for permanent. The income threshold for the employer-sponsored permanent visa should increase with age, though at some older age, people would no longer be eligible for this visa
- for the Skilled Independent visa (subclass 189), remove current list-based restrictions. Additional points should be awarded for ongoing employment in Australia according to income level, with different income benchmarks for different age groups. The design of the points system should be updated regularly based on research, such that points are awarded for factors associated with fiscal and employment benefits.
- introduce a pilot of a special permanent visa subclass for occupations in human services sectors that are largely funded by government (such as aged and disability care), but only if these are facing likely enduring and significant labour shortages that are weakly responsive to wage increases. The visa subclass should be subject to the current TSMIT and require that the applicant remain employed in the relevant sector for 4 years. The pilot should be evaluated for its impacts and should be abandoned if labour shortages can be better met through wage increases and more sustainable alternative funding
- amend settings for temporary skilled migration to increase their duration to 6 years
- increase the duration of stay for Graduate visa holders with Bachelor and higher-level degrees, such that an extension to 5 years is guaranteed, subject to proof of ongoing employment above a set wage threshold. For international students, obtaining a qualification from an Australian tertiary education provider should be associated with an expectation of being able to test their skills in the Australian labour market, but not an expectation that their qualification alone will qualify them for permanent residency (which will increasingly depend on labour market outcomes, including income levels, and age)
- amend settings for employer sponsored temporary and permanent visas to better allow workers to switch employer sponsors including by permitting a short period of unemployment to look for a new sponsor.

This recommendation has higher complexity. The Australian Government would be primarily responsible for these reforms. Given the interactions between visas and the shift away from skill lists towards better recognition of income and age, the reforms are far-reaching. In addition to extensive consultation, implementation will require processes to manage system integrity risks, determination of age and income cut-off points in skilled visas, and further development of the points-based system, among other factors.

REFORM DIRECTIVE 9**Improve occupational licensing arrangements to reduce barriers faced by skilled migrants**

The Australian Governments and regulators should pursue further international mutual recognition of occupational licences, including by improving links between Australian licensing bodies and those in countries with comparable standards and systems. The aim is not to allow *all* international qualifications or licences to be recognised by default, but to expand recognition of qualifications among trusted partner countries and to make existing processes more efficient.

The **expected productivity impact of this recommendation is higher**, and following implementation, the **benefits will likely be realised in the medium term**. The reform would allow highly-skilled migrants to have their qualifications recognised (and in some cases to be licensed) sooner. This would reduce the amount of time that skilled migrants spend in Australia unable to work in their chosen occupation, thereby improving the labour market matching of the migration system. In particular it would likely assist in filling shortages in health and trades, where a lack of access to services present various costs (such as health and safety risks). For the migrant, it will reduce the risks of underemployment and unemployment, and potentially improve career paths — all of which have positive implications for their lifetime fiscal impact.

Specific actions

- For licensing bodies that operate at the national level (such as in health):
 - facilitate a process of collaboration with regulators and/or other institutions (e.g. medical colleges) from selected countries, with the aim of establishing a default recognition
 - instigate changes to licensing administration in cases where the process for recognising international qualifications could be made more efficient (e.g. requiring the migrant to undertake further study to fill any knowledge gaps rather than to re-take their qualification).
- Take an occupation-by-occupation approach to deciding whether the skills assessment undertaken for migration purposes (generally by VETASSESS) is warranted given that migrants usually have proof of qualifications and the assessment is often undertaken by non-experts. In many cases, it would likely be possible to rely on the assessment of the regulator / licensing body for the purposes of migration.

This recommendation has higher complexity. These reforms will typically require focus on individual licenses and occupations. They will often involve multiple regulators and levels of government, as well as regulators and governments overseas. Public health and safety concerns should remain the primary objective with regard to licensing, and reforms should be evidence-based.

REFORM DIRECTIVE 10

Fit for purpose occupational licensing regimes



Australian governments should work with regulators to ensure occupational licensing policy is fit-for-purpose and guided by evidence. Licensing for safety purposes has become more stringent in recent years, but such decisions would be better informed by evidence about their impact on lowering risks and costs. There should be greater consideration of complementary and alternative forms of regulation. At the same time, well-known issues regarding scope of practice between licensed occupations remain unresolved.

The **expected productivity impact of this recommendation is higher**, and following implementation, the **benefits will likely be realised in the medium term**. Reforms will reduce barriers to competition without compromising safety and service quality — and in some areas improve quality, health and safety outcomes by increasing access to services. In some cases, there are already qualified professionals ready to take on new responsibilities. In other cases, reform would spur increased entry into the occupation over time.

Adopting better processes for data collection and licensing assessment would improve identification of inefficient licensing arrangements and better enable geographic mobility in the future. The introduction of digital licensing and general improvements in market information for consumers also gives governments an opportunity to improve data sharing and analytics and review the rationale for various licensing arrangements.

Specific actions

- Australian governments should work with the relevant regulators to re-examine boundary issues relating to occupational licenses, particularly where independent reviews have already highlighted potential gains.
- Australian governments should undertake trials for expanded scope of practice in health services. Where service funding is determined by a Commonwealth-State intergovernmental agreement, the Australian Government should allow the funding arrangement to encourage evidence-based trials (e.g. ensuring trials of novel arrangements in healthcare are appropriately funded through Medicare and/or PBS).
- In developing digital licensing platforms, Australian governments should prioritise choices in technology and design that enable data collection that can inform effective licensing policy and future information sharing between jurisdictions.
- Australian governments should conduct regular, independent reviews of occupational licensing systems in their jurisdictions to improve both efficiency and safety outcomes, efficient scope of practice as well as the optimal mix of licensing and other forms of safety regulation.

This recommendation has higher complexity. Licensing reform will require clarity on the roles and responsibilities between different levels of government and regulators, which will vary depending on the regulatory regime. However, reform efforts should not occur on an ad-hoc basis and would benefit from the support of a broader national reform agenda that can provide pooled resources and better incentives for substantial regulatory experimentation.

State governments vary in their progress towards creating digital licensing platforms and databases, which may lead to compatibility problems as integration across jurisdictions occurs. States and territories will need to prioritise technology neutral solutions, standardised systems, and accessible data sharing arrangements.

There is scope to build on recent trials of changes to scope of practice in healthcare. However, governments need to engage with regulators and industry bodies to ensure safe and proven changes to scope of practice can progress without undue delay, particularly given current shortages and the need for better access to health services.

REFORM DIRECTIVE 11

Improve workplace outcomes and ensure a fair sharing of the gains from productivity improvements



The Australian Government should amend the *Fair Work Act 2009* (Cth) to facilitate more efficient modern awards and enterprise bargaining systems to support productivity and to secure mutual benefits for employers, employees and consumers.

The **expected productivity impact of this recommendation is higher**, and following implementation, the **benefits will likely be realised in the medium term**. The workplace relations system has a fundamental role in driving productivity and wages. Making awards more efficient and flexible would help the workplaces that rely on them and provide benefits through their role as a floor on conditions in enterprise agreements. Processes for varying awards can be improved and awards themselves could be made easier to use and understand. Reducing the barriers to the uptake of bargaining and the enhancing the capacity for employers and employees to find flexible ways of working can encourage productivity and wage growth. Recent amendments to the Fair Work Act have sought to address some of the complexities of bargaining, and have introduced more scope for multi-enterprise agreements. A comprehensive review will be required to assess the effects of the amendments on productivity, prices, and competition.

Specific actions

- Amend section 134 of the *Fair Work Act 2009* (Cth) to clarify the modern award objective, focusing on the needs of the employed; the need to increase employment; the needs of employers; the need to achieve gender equality in the workforce; the needs of consumers; the need to ensure that modern awards are easy to understand; and the likely impact of any exercise of modern award powers on efficiency and productivity.
- Improve the Fair Work Commission's (FWC) ability to vary awards to better achieve the modern awards objective, removing some of the rigidities of the current system and targeting those awards with the greatest potential for improvement.
- In making variations to modern awards, the FWC should consider options that allow employers some choice about how they can meet award requirements, subject to meeting the modern awards objective and undertaking appropriate consultation with employees.
- Limit the ability for enterprise agreements to restrict productivity enhancing changes to technology or workplace practices that are best left to managerial prerogative. This includes amending the Fair Work Act so that the model consultation term would be the only legally enforceable consultation term in enterprise agreements. A mechanism that enables the FWC to specifically authorise an alternative enforceable term should be explored.
- Further loosen the relationship of enterprise agreements with awards by allowing the FWC to approve agreements that do not pass the Better Off Overall Test if a range of public and private interest tests are met. Any changes should have adequate protections in place to avoid undesirable outcomes as exemplified by the *Construction, Forestry, Mining and Energy Union v One Key Workforce Pty Ltd*.

This recommendation has higher complexity. Amendments to the Fair Work Act will require careful drafting and considerable consultation with union and employer groups, business, employees and the community as a whole. The FWC would be given considerable additional discretion under the proposed recommendations, and it will take some time for the development of case law.

REFORM DIRECTIVE 15

Maximise the value of government collected or funded data holdings



The Australian Government, in consultation with the private sector and State and Territory Governments, should improve access to data collected and held by providers of government-funded services by expanding data sharing between the public and private sectors and implementing a comprehensive health data sharing system. To avoid eroding trust in the system, there must be a focus on appropriate controls and safeguards.

The **expected productivity impact of this recommendation is high**, and **the benefits would likely be realised in the medium term**. Expanded access to data will make business and government analytics cheaper and better, with improved products and services for consumers, and more informed public policy and research. In particular, increased data sharing in the health system, by building on existing initiatives such as My Health Record and drawing on lessons from the successful implementation by the Australian Tax Office of Single Touch Payroll, can significantly improve service quality for patients. Wider use of the Digital Identity is likely to lead to more efficient and secure delivery of a range of services that require ID verification.

Specific actions

- Extend the *Data Availability and Transparency (DAT) Act 2022* (Cth) to allow government data to be shared with the private sector. Implementation should be staged, starting with accredited private organisations that use data for policy and research purposes to achieve social objectives, then accredited businesses for commercial use. Security and privacy safeguards should be maintained.
- Use My Health Record (MHR) as the foundation for a comprehensive system for sharing and using health data by implementing several changes:
 - Opting out of the system: the Australian Government should clarify that patients have the right to opt out of the system and if they have not opted out then practitioners should be required to upload relevant health records to MHR. The definition of ‘relevant’ records should be determined in consultation with patients and practitioners.
 - Health software compatibility and standards: The Australian Government should publish a register of software that is integrated with MHR and allows automatic upload of data by healthcare practitioners. Healthcare providers should be encouraged to use this software; for example, by extending the Practice Incentive Program eHealth Incentive beyond general practitioners. In the medium-term, conformance standards should be set, requiring all health software providers to be compatible with MHR by using consistent language and terminology, and a secure gateway so practitioners can connect with each other and upload and download relevant records.
 - De-identification to support system planning: develop a framework to use MHR data for health system-wide planning and policy development — requiring consultation with practitioners and the community on using data, while maintaining trust in MHR and benefiting the broader system.
- The Australian Government should expand access to the Digital Identity (and work towards adopting a single national digital identity) across State and Territory Government services requiring ID (e.g. applying for a drivers licence) and private sector services that require ID (e.g. opening a bank or utility account), with appropriate access controls and safeguards.

This recommendation has high complexity. Legislative changes to the DAT Act would require substantial stakeholder engagement and staged implementation to ensure that trust is maintained, and appropriate safeguards are in place. Improving MHR requires change across many healthcare practitioners and, in some parts of the system, software providers, and there would be challenges due to legacy systems and lack of digital fluency among some practitioners. The Digital Identity would also require careful implementation to ensure it could be used for broader applications in a controlled and secure environment.

REFORM DIRECTIVE 18**Create an investment environment that allows the right activities to occur in the right places**

State and territory governments could make better use of urban land by revising planning regulations to ensure residential, commercial and industrial zoning is not unduly restrictive, and by promoting more flexible and outcome-oriented planning approaches.

Funding models for road infrastructure can be reformed by moving away from fuel excise to distance-based charging, congestion pricing, and general revenue (and potentially, in the longer-run, to pricing that could more generally vary by location or time of use). Road funds would be used to allocate funding to where the returns from investment were highest.

The **expected productivity impact of these recommendations is high** and would **likely be realised in the medium term**. First, improved planning and zoning can help business entry, aiding competition, dynamism and investment. At a higher level, a more flexible and outcome-oriented approach could improve the efficiency of land use as a resource. The efficient use of urban land is increasingly important given home-based work, online retailing, and the need for climate change adaptation.

Road-user pricing would be a significant step towards more efficient investment in public infrastructure. Existing models of road funding and investment do not provide signals about where roads should be built and to what capacity, nor do they limit congestion. Given that excise revenue will fall with electrification, there is a need to provide an efficient and equitable source of revenue to fund road maintenance and provision.

Specific actions

- Reform planning and zoning by:
 - implementing standardised business and industrial land use zones across local government areas
 - aggregating existing zones, where possible, to broaden the range of permissible activities
 - requiring urban planning decision-making processes to consistently consider the community-wide economic benefits from the introduction of competition to incumbent businesses, recognising that dynamic local economies allow businesses to exit as well as enter.
- Progress road-user pricing by:
 - working towards an intergovernmental agreement on road user charging for all vehicle types, focusing on distance priced charging, including any road damage premiums, and subsequently, incorporating congestion charges for crowded roads
 - considering the inclusion of compulsory third party insurance costs in distance-based charges and menu options for motorists to choose between higher distance-based charges and lower fixed charges.

This recommendation has higher complexity. Changes to planning and zoning can have complex effects on urban density, transport flows, public amenities and some markets. Such reforms would be the primary responsibility of State and Territory Governments, with the involvement of Local Governments. Progress on road-user charging is complicated by unresolved constitutional challenges, but will, in any case, require all governments to coordinate their actions. An intergovernmental agreement would help set out roles, clarify how revenue will be used and allocated, and ensure appropriate funding for local, state and national roads. In practical terms, distance-based pricing could be established relatively quickly.

REFORM DIRECTIVE 21

Pursue economic resilience and the benefits of open trade and foreign investment



The Australian Government should pursue economic resilience by harnessing open trade and investment, recognising the potential expansion of trade in services. Public interventions should focus only on vulnerable and critical supply chains that present major risks for Australia and cannot be addressed in other ways. The Australian Government should also ensure its Foreign Investment Review Framework considers its potential chilling effects on investment.

The **expected productivity impact of this recommendation is high**, with the **benefits likely to be realised in the medium term**. Trade in goods and services and foreign direct investment (FDI) are key sources of competitive pressure for domestic businesses, reduce prices for end-users, and are important mechanisms for diffusing knowledge and innovation.

Supply chain shocks and global upheaval do not diminish the case for openness. As a small advanced economy, increased global linkages are likely to be the best way for Australia to build resilience to deal with global uncertainties. While businesses and governments are reconsidering how to manage the risks associated with supply chain disruptions, there is the danger that calls for 'sovereign capability' can encourage rent seeking, which would entail significant economic costs.

Growth of trade in services stems from the advancement and proliferation of technology, as well as rising incomes among Australia's trading partners. Australia is well-placed to benefit from import competition and export opportunities in a number of services.

Specific actions

- Take immediate action to unilaterally reduce Australia's statutory import tariff levels to zero. (Some administrative architecture may remain to deal with non-tariff regulation at the border.)
- Progressively remove Australia's anti-dumping and countervailing measures and subject any new measures to an economy-wide cost benefit test.
- Increasingly accept product standards adopted in other leading economies as 'deemed to comply', provided that a transparent review could be undertaken in cases where the Australian Government identified a significant safety risk.
- Bring application fees for proposed FDI into agricultural land assets closer into line with other forms of investment, including by:
 - applying indexation to the threshold investment value, as is done with most commercial investments
 - adjusting the fee tiers so as to reduce the marginal rate fee as a proportion of investment amount.
- Address potential barriers to trade in services both 'at the border' and 'behind the border'. Some relevant policy and regulatory levers include trade policy, tax settings, occupational licensing, foreign direct investment, improved recognition of overseas qualifications and temporary migration settings.

This recommendation has high complexity. While eliminating nuisance tariffs is relatively straightforward, other changes involve greater complexities. Addressing 'at the border' and 'behind the border' barriers to trade in services will involve a range of policy levers, such as tax settings, occupational licensing and changes to the regulation of foreign direct investment. Trade protections such as anti-dumping measures benefit a relatively narrow set of businesses; their removal may warrant broader consideration of the role of government in facilitating and reacting to structural adjustment. The acceptance of international standards is often agreed to in principle, but progress needs to be encouraged.

REFORM DIRECTIVE 22

Implement best practice resource allocation when funding public infrastructure



The Australian, State and Territory Governments should improve institutional and governance arrangements that address the systemic absence or disregard of rigorous cost-benefit analysis (CBA). This is particularly the case for major infrastructure projects and, in the longer term, for other government expenditures, such as defence and social services. Independent CBAs should be published and provided to government decision makers before an investment decision is made, and there should be transparency and consistency in the assumptions and inputs used, as well as accountability for how decision makers use (or do not use) results in project selection.

The expected productivity impact of this recommendation is high. Governments spend tens of billions on public infrastructure each year. These projects routinely suffer from optimism bias, with large cost blowouts and long completion delays. Even small improvements from better use of CBA — such as a slight shift in government decision making or a small percentage reduction in cost overruns — would amount to substantial efficiency gains in dollar terms. Following the recommendation's implementation, the **benefits will likely be realised in the short term**, as new CBA arrangements and uses could be applied immediately to subsequent infrastructure investments and project selection.

Specific actions

- Governments should ensure that for major infrastructure projects, robust CBAs are undertaken and assessments are published and provided to government decision makers before an investment decision is made. This should include independent evaluation of the assumptions and inputs used in a CBA, which could be undertaken by a single institution across Australian, state and territory governments to support consistency and comparability across different projects and programs (such as the proposed Evaluator General at the Australian Government level). It should involve transparency about the analysis, including on cost and benefit estimates and forecasts and scenario selection, with independent assessments to be published and provided to government decision makers before an investment decision is made. Government officials should also align their investment decisions with CBA results and be held accountable for how the CBA outcomes are used — or not used — in project selection.
- Alliance contracting or collaborative contracting for major infrastructure projects — which involve contractors earlier in the planning and scoping stages of a project — could improve governments' understanding of costs and benefits during project planning stages.
- Governments should consider the improvements to institutional and governance arrangements required to support consistency and comparability across different projects and jurisdictions. This could be informed by successful models from overseas, including the standardised approach to cost and benefit estimates used by the US's Washington State Institute for Public Policy for consistency across a range of programs.
- CBA should also be applied to other government activities like defence and social services, noting that these areas are often more complex. These areas are currently predisposed to use other tools for assessment, like cost effectiveness studies, which provide less guidance to governments about how to allocate finite budgets across projects that are very different in nature.

This recommendation has low complexity. The elements of good practice CBA are widely known, and there are numerous existing CBA evaluation models that can be adopted. There may be some aspects of governance arrangements that need to be tailored for specific levels of government or project types. For example, the Grattan Institute has recommended that before government funds are committed to an infrastructure project valued at \$100 million or more, independent infrastructure advisory bodies across all levels of government should have a legislated role to assess the quality and assumptions underpinning the project's business case, costs and benefits, and publish this assessment.

REFORM DIRECTIVE 23

Using health funding approaches to diffuse innovations



Australian governments should reform healthcare funding to improve the functioning of the healthcare system and should better diffuse best practice in health services that they deliver or procure. They should use co-operative funding models that support long-term and patient-centred care, to encourage providers to innovate and better meet consumers' needs.

With Australian, State and Territory Governments spending a total of \$142.6 billion, about 7% of GDP, on health in 2019-20, the **expected productivity impact of this recommendation is high**. Following the recommendation's implementation, **the benefits will likely be realised in the medium to long term**. The productivity and welfare costs of inefficiencies and clinical variation in healthcare, such as over-prescription of antibiotics or regional variation in preventable hospitalisations, can be reduced by reforming funding models to encourage a more patient-centred approach with greater focus on longer-term and/or preventative care. And allocating government funding to procedures and services that have been proven to lead to good patient outcomes, such as by regularly updating the Medicare Benefits Schedule (MBS), would be a direct mechanism for providing medical practitioners with best practice guidance.

Specific actions

- The Australian Government should require the Medical Services Advisory Committee (MSAC) to undertake an annual review of selected MBS items so that funding is only provided to treatments that use current medical best practice. This should be focused on treatments where emerging Australian and/or international evidence questions the efficacy or cost effectiveness of existing procedures; treatments that MSAC has received clinician feedback on doubting their effectiveness; and highly costly treatments that receive large government subsidies through the MBS and have not been reviewed in the past 10 years. The Australian Government should assess the need for higher levels of funding for MSAC to undertake these annual reviews as a standing function.
- The Australian and State and Territory Governments should work together to accelerate and scale up long-term co-operative funding mechanisms that align the incentives of primary and hospital providers to avoid costly hospital admissions. Capitation models, like the Victorian HealthLinks program, and mechanisms supported by the Independent Hospital and Aged Care Pricing Authority are examples that should be considered to achieve this.
- Successful implementation of longer term, patient centred and co-operative funding models will also require overcoming regulatory and legislative obstacles, such as through changes to the *Health Insurance Act 1973* (Cth) (which can restrict the primary health activities that insurers and others can fund) and improving health data sharing across different parts of the system (between health care providers, between health care providers and government funders/regulators, and between health care providers and service users).

This recommendation has high complexity. Regularly updating the MBS would require significant effort and could require the government to provide MSAC with more resources. Implementing funding models that align incentives across the health system and support a longer-term patient-centred approach would be complex given the highly fractured funding and governance mechanisms across the system.

REFORM DIRECTIVE 25

Create policy settings that enable and respect private adaptation decisions



Australian, State, and Territory governments should pursue an adaptation policy that: recognises that individuals, households, and business will continue to be the principal decision makers about which occupations, sectors, and regions they will transition into as Australia's climate changes; helps inform these private decisions; and avoids policy settings that inadvertently constrain them.

This recommendation is expected to have a **high impact on productivity**, and following implementation, the **benefits would begin to be realised in the medium term**. Inadvertently constraining private adaptation decisions risks placing a growing amount of economic resources at risk over coming decades.

Specific actions

It is recommended that:

- Australian governments should avoid the expansion of insurance sector interventions and set a medium-term time frame for the phase out of the Northern Australia Reinsurance Pool.
- State and Territory governments should mandate the pre-sale disclosure of climate risks facing individual residential and commercial properties.
- For greenfield developments, the cost of climate risk reduction measures should be incorporated into the price of buying into the new development, through mechanisms like developer levies, that ensure that future residents face cost-reflective pricing.
- If transitional assistance is provided to particularly climate-impacted regions, industries and workers, it should be structured in a way that lets people decide which regions, sectors, and occupations they are best placed to transition into. It should not be made conditional on recipients committing to live or work in a particular region, sector, or occupation.
- Proposed adaptation-related infrastructure projects (including projects to rebuild or relocate communities impacted by large scale natural disasters) should be subject to rigorous cost-benefit analysis that incorporate plausible climate projections over the projected life of the asset, and compared with that of alternative proposals. In the case of community rebuilding proposals, a rigorous cost-benefit analysis would consider the broad range of costs and benefits — cultural, social, economic, and environmental — of rebuilding in-situ with increased defensive measures, relative to rebuilding in an alternative location.

These recommendations have **lower complexity** as in many instances the benefits come from not implementing damaging policies and through undertaking better processes in the allocation of resources towards new adaptation projects. That said, some legislative change at the State and Territory Government level may be required to implement developer levies.

REFORM DIRECTIVE 26

Elevate the Safeguard Mechanism to be Australia's primary emissions abatement mechanism



The Australian Government should progressively convert the Safeguard Mechanism (SM) into Australia's primary economy-wide emissions abatement mechanism, covering a wider range of sectors, deepening its coverage within sectors, and allowing for the transfer of emissions rights from those sectors and facilities that can readily reduce emissions to those that face higher abatement costs.

Implementation of this recommendation could be expected to have a **high impact on productivity** that could be **realised over the short-term in regard to facilities currently captured by the SM**, and **over the medium-term in regard to additional facilities that might be included at a later date**. This productivity benefit would principally flow from the reduced risk of investment associated with greater policy certainty for entities that are otherwise ready to pursue efficient emissions abatement. Modelling of the broader Powering Australia Plan, of which a reformed SM is one element, was estimated to drive \$76 billion in investment between now and 2030. Any policy driven misallocation of this investment could weigh notably on productivity over the longer-term.

Specific actions

The Australian Government should progressively turn the SM into Australia's primary economy-wide emissions abatement mechanism by collectively implementing the following recommendations:

- Define SM facility baselines, the total amount of net emissions that captured facilities are allowed to produce each year, in absolute emissions terms, not emissions intensity terms.
- Expand SM coverage by reducing SM facility thresholds, the total amount of annual emissions that a facility can produce before becoming subject to the SM, from 100 000 tonnes of CO₂-equivalent (CO₂-e) to 25 000 tonnes of CO₂-e.
- Impose SM baselines on individual electricity generators, not at the sectoral level. Failing that, the sectoral baseline for the grid connected electricity sector should be progressively ratcheted down to remove the bulk of headroom between current emissions and the sectoral baseline, though this would not have the same efficiency benefits as directly including individual electricity generators in the SM.
- Expand transport sector coverage: once electricity generators are covered at facility level, the SM should be extended to liquid fuel wholesalers, with downstream vehicle emissions imputed to them.
- Allow generation of sub-baseline abatement credits. If SM baselines are expressed in absolute emissions terms, SM facilities should be allowed to generate emissions credits for emissions abatement below their SM baseline.
- No additional Emissions Intensive Trade Exposed Industries (EITEIs) protections should be provided through the SM. Under the design of the SM, all sub-baseline emissions are allocated for free, providing inbuilt protection against carbon leakage.

The implementation of the recommendations under this reform directive has **lower complexity**. They would be administratively straightforward to implement given that many facilities that would become captured by the SM over time are already required to periodically report their emissions under the National Greenhouse and Energy Reporting Scheme. The creation of credits for sub-baseline abatement by SM facilities will be enabled by the passage of legislation currently before Parliament (Safeguard Mechanism (Crediting) Amendment Bill 2022).

REFORM DIRECTIVE 27**Increase the integrity of carbon offsets**

The Australian Government should increase the integrity of Australian Carbon Credit Unit (ACCU) offsets as an instrument for carbon avoidance or removal, increasing the likelihood that the Safeguard Mechanism will achieve credible emissions reductions at least cost over coming years.

Ensuring the integrity of ACCUs is expected to have a **high impact on productivity**, with the **benefits realised in the short term**.

Specific actions

- The Australian Government should discontinue the 25-year permanence period option currently available for sequestration-based ACCU projects.
- The Australian Government should introduce an additional class of sequestration-based ACCUs with permanence requirements that align with the more enduring permanence provisions of biodiversity market.
- State and Territory governments should stipulate the volume or the proportion of biogas that needs to be captured by existing ACCU-generating landfill gas capture projects under existing regulations.
- The Australian Government should require the Clean Energy Regulator (CER) to publish project offset reports submitted to the CER, and periodic ACCU project audit reports.

This recommendation has **lower complexity**. Releasing information that is already provided to the CER, stipulating how existing regulations are enforced, no longer allowing sequestration-based projects to opt-in to 25-year permanence periods, and leveraging existing biodiversity market principles to create a new class of projects, are comparatively straightforward actions to increase the integrity of carbon offsets.

REFORM DIRECTIVE 28

Remove emission reduction measures that are not complementary to the Safeguard Mechanism



The reform of the Safeguard Mechanism (SM) should be accompanied by a process to identify and phase out emissions abatement policies that are not complementary to the SM. New and remaining emissions reduction policies should have their indirect carbon costs independently estimated and made public.

These recommendations are estimated to have a **high impact on productivity**, with **benefits realised in the short term**. Phasing out higher-cost abatement policies and constraining the introduction of new higher-cost policies, will promote least-cost emissions abatement and productivity growth.

Specific actions

To give effect to this recommendation:

- The Australian Government should commission a review of existing Australian, State, and Territory emissions abatement policies to assess their complementarity to a reformed SM and recommend a timetable for the removal of non-complementary measures identified by the review.
 - A 'complementary measure' would be one that either drives emissions abatement from emissions sources not covered by the SM, addresses market failures that constrain the pursuit of abatement from emissions sources covered by the SM, or that deliver broader non-carbon abatement related benefits.
- Australian, State, and Territory governments should commit to stipulating how remaining non-Safeguard Mechanism policies, and new emissions abatement policy proposals, are complementary to the SM, and have their estimated indirect carbon prices independently estimated and made public.

This recommendation has **lower complexity**. Reviews of the complementarity of existing climate measures have been previously commissioned by Australian governments, and methodologies for estimating the indirect carbon price of policy measures are readily available.

REFORM DIRECTIVE 29**Pursue a least cost approach to securing electricity supply**

The government proposed Capacity Investment Scheme (CIS) should be implemented on a technology-neutral basis and be open to both supply and demand side participation by large scale and small-to-medium sized scale electricity users and suppliers, with the latter potentially coordinated through ‘virtual power plant’ platforms. An example of demand side participation is a virtual power plant operator that funds the installation of the technology required to reduce non-essential electricity demand at those times when electricity supply is lower than demand, supporting grid stability in the process. The CIS should also be subject to a five-year sunset clause, with an independent review commissioned to assess the value of its continuation before deciding whether to extend its life.

These recommendations are estimated to have a **high impact on productivity**, with **benefits realised in the short term**. Failing to underwrite electricity grid stability during Australia’s transition to a renewable electricity grid risks broader economic disruptions, with associated losses to productivity. Establishing a potential path back to using variability in wholesale prices as the central intermittence management policy may also come at lower long run costs than a permanent CIS.

Specific actions

The CIS that Australian, State, and Territory governments have proposed to implement should be:

- implemented with a five-year sunset clause, and independently reviewed ahead of any decisions to extend its life
- implemented on a technology neutral basis, allowing for both supply and demand-side participation by households and businesses
- open to both large scale participants and small-to-medium sized participants, potentially aggregated and coordinated through ‘virtual power plant’ platforms.

This recommendation has **lower complexity**. Setting the overarching goals that are to be achieved by projects bidding into the CIS, rather than deciding ex-ante what technologies can achieve those goals, will lower the search costs for projects that will best deliver desired policy outcomes.

3. Recommendations linked to reform directives

Building an adaptable workforce: *education*



Reflecting the role of education in creating a high skilled and highly adaptable workforce, broad-ranging reforms are proposed across higher education, vocational education and training (VET), schools and lifelong learning. These reforms emphasise stronger foundational learning to support further skills acquisition throughout individuals' working lives via a broader array of flexible options.

Higher education reforms aim to create a more dynamic university sector, putting greater emphasis on quality teaching. Loan reforms would expand access to high quality VET, and encourage emerging vocational options that develop broad, adaptive and less occupation-specific skills.

A more coherent approach to lifelong learning and ongoing skill development is based on targeted tax incentives, and the improved availability and recognition of flexible, short form training options.

Long-term improvements in school outcomes are possible through increasing (and judicious) use of learning technology and a stronger link between pedagogical evidence and classroom practice. Proposed reforms focus on assisting governments and schools in this journey.

Reform directive 1: Improve schools' capacity to lay the educational foundations for the future workforce



Recommendation 8.1

Leverage digital technology in schools

State and Territory Governments should work with schools to extend, improve and embed the use of education technology in order to realise future benefits for students.

Initiatives should aim to:

- enable teaching practices to evolve with the changing classroom environment by prioritising the development and implementation of digital tools to support teaching and learning, while balancing flexibility for individual jurisdictions' needs – this could include developing an online assessment tool and giving the Australian Education Research Organisation (AERO) responsibility for researching and vetting effective digital technologies to be implemented in schools
- replace manual school administrative processes with technology-based and automated solutions where this has not been done already – this could include evaluating technology-based solutions for administrative processes currently in place and developing mechanisms to diffuse these to other schools
- support continuous commitment to ongoing professional development modules that support teachers in using data analytics to drive student improvement.



Recommendation 8.2

Make best practice teaching common practice

State and Territory Governments should facilitate greater classroom access for the Australian Education Research Organisation (AERO) to support more principal and teacher involvement in education research to ensure that evidence-based research provides information that is salient and readily applicable by practitioners.

Initiatives should focus on:

- enabling greater observation of, and feedback on, classroom teaching practices, by supporting more informal teacher networks, and creating or strengthening the existing roles within the local school system for highly accomplished and lead teachers (HALT) to share their in-depth knowledge and skills with their colleagues
- increasing curriculum implementation support for teachers, by curating high-quality, evidence-based and government endorsed curriculum resources (curriculum plans, whole-subject sequences, lesson plans and classroom tools), to be made available for teachers and school leaders from a single source.

Reform directive 2: Enable innovative schooling approaches for improved learning outcomes



Recommendation 8.3

Enable experimentation with alternative approaches to schooling

State and Territory Governments should be open to experimenting with new, innovative school models or operational changes where there is an evidence base (including overseas) to suggest outcomes could be improved for Australian students.

In the first instance, legislative, regulatory, administrative or policy barriers that would prevent individual schools varying their operating model should be removed. In addition, there should be capacity and appropriate resourcing within the local school system to allow the merits of any trials to be evaluated.

Innovations should aim to:

- offer different lesson delivery options to lift quality teaching and learning, including for example, offering online classes in the absence of a teacher with the relevant expertise in a topic, or trials of untimed syllabus approaches to promote a continuous learning process
- better cater to student needs to encourage school attendance and lift student outcomes, including through variations in school hours and use of technology to personalise students' learning environment.

Reform directive 3: Grow access to tertiary education



Recommendation 8.4

Grow access to higher education over time

The Australian Government should adopt an improved demand-driven model for providing Commonwealth supported places to domestic undergraduate university students, subject to measures outlined in other recommendations that: contain fiscal costs (recommendation 8.5); and ensure all students are adequately supported (recommendations 8.13 and 8.14).



Recommendation 8.5 **Better targeting of investment in higher education**

The Australian Government should introduce a new university funding model to better target investment while facilitating wider access to higher education.

- Total university funding per student by field of study (comprising the student contribution and government contribution) should continue to be the cost of delivery for that field (reflecting a median estimate of efficient costs with the methodology to be refined over time as outlined in recommendation 8.6).
- The student contribution should be set based on average expected earnings for each field of study, with students with a greater capacity to repay incurring more debt. Student contributions should be higher, on average, to recoup a greater share of the costs of university from those who benefit from attending university, rather than recouping this from the broader tax base. This would also help to fund the return to a demand-driven system.
- The government contribution should make up the gap between the student contribution and estimated cost of delivery for each field of study.



Recommendation 8.6 **Improve price setting in tertiary education**

The Australian Government should conduct regular costing exercises to estimate the cost of delivering tertiary teaching and research. The methodology underpinning these cost exercises should be periodically reviewed and refined to inform more accurate cost estimates, and should aim to ultimately reflect only efficient costs. These cost estimates should inform funding as well as price and loan caps, to encourage efficient delivery of quality education and research by tertiary institutions.



Recommendation 8.7 **Expand loan eligibility to more students**

The Australian Government, in consultation with State and Territory governments, should gradually expand VET Student Loan eligibility.

- Access should expand to more Diploma and Advanced Diploma level courses. Instead of current criteria, all courses should be eligible except those that are primarily taken for leisure or have demonstrated poor labour market outcomes. This expansion should be evaluated after a suitable period, including observed effects of the earlier expansion on student participation, course decisions and employment outcomes; and any evidence of sorting by providers. Following this evaluation, and addressing any implementation issues, eligibility should also be considered for Certificate IV and Certificate III courses.
- Loan fee arrangements should also be equalised across the tertiary sector, levied on all students regardless of type (that is, extended from fee-for-service VET students and non-university higher education students to include subsidised VET students and university students). The loan fee rate should also be lowered reflecting application to a broader base of students.

Reform directive 4: Support a culture of lifelong learning for an agile workforce



Recommendation 8.8

Consolidate support for lifelong learning

The Australian Government should consolidate and examine the effectiveness and accessibility of available programs to support lifelong learning and to reduce gaps and increase uptake. In doing so, it should evaluate the effectiveness of targeted programs to inform and prioritise policies for a consolidated lifelong learning strategy by:

- trialling policies that target support at employed lower-income people, including vouchers for career planning and work-related upskilling and reskilling
- evaluating the incoming Skills and Training Boost to assess its effects on the uptake of additional overall training, the skills it develops, productivity, labour mobility, and the characteristics of the businesses most responsive to the measure. Government linked administrative datasets will be useful for such an evaluation but might need to be supplemented
- extending the existing capacity for self-education deductions to education that is likely to lead to additional income outside of the employee's existing employment. This change should be evaluated after a suitable period, and pursued subject to assurance that strong integrity measures can effectively reduce the risks of fraudulent claims
- examining the effectiveness of training programs delivered to people who are unemployed and those transitioning to work such as Employability Skills Training programs, particularly for people later in life.

Government should also increase the accessibility, flexibility, and coherence of available pathways by:

- extending income-contingent loans to more VET courses (recommendation 8.7)
- providing alternative exit opportunities through the provision of nested qualifications (recommendation 8.13)
- requiring publicly-funded universities to make their lecture materials available online, with consideration of extending this to some aspects of government-funded VET where that is practically feasible (recommendation 8.9)
- ensuring that the Australian Government's Microcred Seeker extend beyond courses supplied by TEQSA-recognised providers to the VET sector and where possible, to other private and well-recognised domestic and international course offerings
- constraining regulations that make acquiring new skills and moving to new occupations overly onerous. Most particularly, through regular review of occupational licensing policies and addressing issues in scope of practice (reform directive 10).

Reform directive 5: Increase tertiary education teaching quality to underpin a well-trained workforce



Recommendation 8.9

Leverage information to improve quality

The Australian Government should:

- increase the transparency of teaching performance by requiring universities to provide all lectures online and for free
- refine and validate new Quality Indicators for Learning and Teaching (QILT), and use these and other data to develop and publish more meaningful indicators of tertiary teaching quality and performance
- adapt the ComparED tool to address the risk that students may misunderstand its information and consider the option of abandoning it and providing additional QILT data to non-government funded websites that cover many other aspects of higher education providers relevant to student choice
- give the Tertiary Education Quality and Standards Agency (TEQSA) the responsibility to undertake external university teaching quality assurance review processes akin to those applied by the Quality Assurance Agency (Scotland).



Recommendation 8.10

Professionalise the teaching role

The Australian Government should bolster the incentives for, and prestige of, higher education teaching by:

- facilitating trials of additional funding for undertaking research and teaching development provided to individual staff based on their teaching performance, drawing on the Griffith Business School's Teaching Excellence Recognition Scheme (TERS)
- trialling a modest Australian Research Council Grant that provides funding for teaching focused research for 6 months to a year
- enhancing preparation for higher education teaching, informed by the evidence collected by initiatives outlined in recommendations 8.9 and 8.11.



Recommendation 8.11

Develop an Australian evidence base

The Australian Government should extend the role of the Australian Education Research Organisation (AERO) to the collection and dissemination of evidence on best practice post-school teaching, covering both VET and higher education. As part of this new role, AERO should also:

- draw on the lessons from the teaching practices of awardees of the Australian Government's Australian Awards for University Teaching
- undertake a rapid review of the use of formative and summative review processes and professional development initiatives in higher education institutions.

**Recommendation 8.12****Favour light-handed and simple incentives over performance-based funding**

The Australian Government should:

- put on hold the scheduled commencement of performance-based funding of universities in 2024 and only reinstitute if its risks are better managed and if other approaches to improving the performance of universities have proved ineffective
- explore the option of financial rewards to higher education providers that AERO identifies as having made successful efforts to improve and use formative assessment tools and professional development (drawing on recommendation 8.11).

Reform directive 6: Better and more flexible matching between students and work opportunities

**Recommendation 8.13****Expand alternative exit opportunities through the provision of nested qualifications**

The Australian Government should require that for any given undergraduate degree, Australian higher education providers create at least one subset of courses that, if completed, lead to a lower level qualification for students who decide to withdraw before completing the whole degree ('a nested qualification').

The Australian Government should leave the design, requirements, and timing of the nested qualification/s to providers' discretion, with the exception that any qualification would need to meet the relevant Tertiary Education Quality and Standards Agency (TEQSA) standards and monitoring requirements.

**Recommendation 8.14****Give students support to complete and clarity to exit**

The Australian Government should amend the *Higher Education Support Act 2003* (Cth) (HESA) to support completion where desirable and facilitate early exits where necessary.

It should do this by:

- providing grants to encourage higher education providers to experiment with and share new strategies for student retention
- assessing any individual grant for its effectiveness and lessons in post implementation reviews and evaluating the higher education grant program as a whole after six years to determine whether rounds of funding under the grant have contributed to a demonstrable improvement in student completion rates
- amending the 'census date' in the HESA to the 'payment date' and requiring that universities effectively communicate to students that the payment date is the time when they can exit without having to pay fees for any initially commenced course.

Reform directive 7: VET reform that supports an adaptive workforce



Recommendation 8.15 Support a responsive VET sector

The Australian Government, in consultation with State and Territory governments, should continue reforms that enable the VET sector to support an adaptive workforce and keep pace with industry needs, by:

- monitoring the development of training packages under the newly formed Jobs and Skills Councils (JSCs) to:
 - ensure their development takes place within acceptable timeframes
 - identify and disseminate best practice and innovative training package design models
- prioritising the development of cross sectoral skills standards that are applicable across industries over the next year to both reduce duplication in training package development for the JSCs and allow individuals enrolled in the VET system to be assessed against these new standards as soon as possible.



Recommendation 8.16 Improve VET teaching, pathways and partnerships

To ensure the successful implementation of Skills Reform, the Australian Government should:

- fund extra training and development programs for VET trainers and assessors so they can adequately perform independent and proficiency based assessment
- task the National Centre for Vocational Education Research to conduct a census of the VET workforce, focusing broadly on the characteristics of teachers at the provider level, including their pedagogical and occupational qualifications, as well as industry experience.

The Australian Government, together with State and Territory governments, should also continue to improve pathways between VET, higher education and industry.

- Other State and Territory governments should monitor and follow the example set by the New South Wales Government's Institutes of Applied Technology, and support local models of vocationally oriented tertiary education that deliver qualifications combining VET and higher education content together with industry expertise.

Building an adaptable workforce: *migration*



Significant reforms to skilled migration could yield large productivity benefits. A shift away from occupation-based lists towards wage thresholds as the basis for employer sponsored migration can re-focus the program on productivity.

Reform directive 8: A better targeted skilled migration system



Recommendation 7.1 Abolishing investor visas

The Australian Government should abolish the Business Innovation & Investment visa program. Temporary migration should be facilitated for people with genuine plans to start a business in Australia, while pathways to permanent residency should involve the revised Skilled Independent visa, based on a points test that better accounts for income levels and age.



Recommendation 7.2 Implementing wage thresholds for employer sponsored visas

The Australian Government should remove current list-based restrictions for employer-sponsored temporary and permanent skilled visas and set an income threshold well above the Temporary Skilled Migration Income Threshold rate. The income threshold that applies to temporary migration should be lower than for permanent. The income threshold for employer-sponsored permanent visas should increase with age, though at some older age, people would no longer be eligible for this visa category.



Recommendation 7.3 Improving Skilled Independent visas

For the Skilled Independent visa (subclass 189), the Australian Government should remove current list-based restrictions, but the points system should be able to award points for any factors shown to be associated with fiscal and employment benefits. Additional points should be awarded for ongoing employment in Australia according to income level, with different income benchmarks for different age groups. Moreover, the design of the points system should be updated regularly based on empirical research.



Recommendation 7.4

Meeting the needs of human services without stifling wage increases

The Australian Government should introduce a pilot of a special permanent visa subclass for occupations in human services sectors largely funded by government (such as aged and disability care), but only if these are facing likely enduring and significant labour shortages that are weakly responsive to wage increases. The visa subclass should be subject to the current Temporary Skilled Migration Income Threshold, and include a condition that the applicant remain employed in the relevant sector for 4 years.

The pilot should be evaluated for its impacts and need after several years.

It should also be abandoned if the Australian Government develops sustainable alternative funding options for aged care that are sufficient to meet the wage increases required to limit labour shortages.



Recommendation 7.5

Improving temporary migration and pathways to permanent residency

The Australian Government should amend settings for temporary skilled migration to increase their duration to 6 years, subject to continuous employment (for a set percentage of a given year) with a sponsoring employer (with the ability to move to a new sponsoring employer under the same visa).

While temporary skilled migration visas should not come with an expectation of permanent migration, pathways to permanent migration should be available under revised employer-sponsored and independent skilled visas.

For international students, obtaining a qualification from an Australian tertiary education provider should be associated with some expectation of being able to test their skills in the Australian labour market, but not an expectation that their qualification alone will qualify them for permanent residency. The Australian Government should increase the duration of stay for Temporary Graduate visas (subclass 485) for graduates with Bachelor and higher level degrees, such that an extension to five years is guaranteed subject to proof of ongoing employment above a set wage threshold.

These changes should be subject to the revised Employer Nominated and Skilled Independent visas, both of which would place greater emphasis on age and income (recommendations 7.2 and 7.3).



Recommendation 7.6

Improving job mobility for employer-sponsored visas

The Australian Government should amend settings for employer-sponsored temporary and permanent visas to better allow workers to switch to competing employer-sponsors including by permitting a short period of unemployment while looking for a new sponsor.

Building an adaptable workforce: *occupational licensing*



Following on from automatic mutual recognition of occupational licences, a number of reform directions are proposed to ensure that licensing is not creating undue barriers to the mobility and adaptability of the workforce. Streamlining international recognition and expanding allowable scope of practice within licensed occupations are key priorities.

Reform directive 9: Improve occupational licensing arrangements to reduce barriers faced by skilled migrants



Recommendation 7.7

Expanding the default recognition of international licences

Australian governments and regulators should pursue further international mutual recognition of occupational licences by improving (and potentially formalising) links between Australian licensing bodies and those in similar countries.



Recommendation 7.8

Aligning migration and occupational license requirements

Australian governments and regulators should coordinate to align skilled migration requirements with occupational license recognition requirements, including by removing duplication of assessment where possible.

Reform directive 10: Occupational licensing regimes that are fit-for-purpose



Recommendation 7.9 Address known issues in scope of practice

Australian governments should work with the relevant regulators to re-examine boundary issues relating to occupational licences. In particular, where independent reviews have already highlighted problems or potential gains to service quality, safety, and productivity, governments and regulators should develop plans to implement those changes.

As an example, the Australian Government should work with the Australian Health Practitioner Regulation Agency to expand Medicare Benefits Schedule and Pharmaceutical Benefits Scheme items to nurse practitioner services that currently receive inadequate funding. Consideration should be given to amending requirements for collaborative arrangements and to credentialing policy, given their importance to the employment of Nurse Practitioners.



Recommendation 7.10 Pursue trials into expanded scope of practice

State and Territory Governments should undertake trials for expanded scope of practice in health services where supported by evidence. Where service funding is determined by an intergovernmental agreement (between state and federal levels) the Australian Government should allow the appropriate funding arrangements to encourage the use of evidence-based trials.

As an example, State and Territory Governments should undertake similar trials as those run in New South Wales and Queensland with regard to the prescription scope of pharmacists' providing vaccinations and low-risk medications. The Australian Government should ensure that the novel arrangements that are the subject of these trials are given equivalent funding through the Medicare Benefits Schedule or the Pharmaceutical Benefits Scheme, where the benefits are substantiated.



Recommendation 7.11 Improved process for regular review of licensing policy

Australian governments should conduct regular, independent review of occupational licensing systems in their jurisdictions, aiming to improve efficiency without compromising safety outcomes, considering efficient scope of practice as well as the optimal mix of licensing and other forms of safety regulation. Individual jurisdictions should drive the process, sharing the findings and conclusions publicly such that other jurisdictions may benefit. In some cases, the process of review and reform could usefully be driven by the coordinated efforts of all Australian governments, including through regular meetings at the ministerial level.



Recommendation 7.12

Digital licensing designed to enable future data sharing and analytics

State and Territory Governments should continue to develop digital licensing platforms, prioritising choices in technology and design to enable future integration, information sharing and analytics.

Building an adaptable workforce: *workplace relations and platform work*



We propose a suite of practical reforms to labour market regulation to increase the scope for business-level productivity improvement while maintaining effective protection of accepted minimum standards.

To promote the productivity benefits of the gig economy while addressing risks to workers, we outline a regulatory framework with safeguards relating to insurance, safety and dispute resolution.

A renewed focus on awards is a key priority – to expand flexibility for many small businesses, improve compliance and provide a better basis for formal agreement-making. Incremental changes to the latter would also make it easier for businesses and workers to make mutually agreed workplace changes through formal agreements, and re-focus enterprise agreements on their core objective — productivity improvement.

Reform directive 11: Improve workplace outcomes and ensure a fair sharing of the gains from productivity improvements



Recommendation 7.13

A more efficient and fairer approach to adjusting awards

The Australian Government should amend the *Fair Work Act 2009* (Cth) to:

- replace the paragraphs of s.134(1) with seven paragraphs that cover:
 - (a) the needs of the employed
 - (b) the need to increase employment
 - (c) the needs of employers
 - (d) the need to achieve gender equality in the workforce
 - (e) the needs of consumers
 - (f) the need to ensure that modern awards are easy to understand
 - (g) the likely impact of any exercise of modern award powers on efficiency and productivity.
- remove the need for work value reasons alone for variations to award minimum wages outside of the Annual Wage Review, allowing the Fair Work Commission to have the same power to adjust award minimum wages in award reviews as the minimum wage panel currently has in annual wage reviews
- make it explicit that the Fair Work Commission should make variations to awards that would *better* achieve the modern awards objective, rather than only being required to make changes that are necessary to comply with the objective
- require that when reviewing and varying modern awards, the Fair Work Commission should use robust analysis to set issues for assessment, prioritised on the basis of likely high yielding gains, and consult widely with the community on reform options.



Recommendation 7.14 **Introducing menus into industrial awards**

In making variations to awards, the Fair Work Commission should seek to include options that allow employers some choice about how they can meet award requirements, subject to meeting the modern awards objective and appropriate consultation with affected employees.



Recommendation 7.15 **Limit restrictive enterprise agreement content**

The Australian Government should limit the ability for enterprise agreements to restrict productivity enhancing changes to technology or workplace practices that are best left to managerial prerogative by:

- leaving employers and employee representatives free to develop mutually beneficial consultation clauses in enterprise agreements, but amending section 205 of the *Fair Work Act 2009* (Cth) so that the model consultation term (as currently prescribed by Schedule 2.3 of the *Fair Work Regulations 2009* (Cth)) would be the only legally enforceable consultation term in an agreement if there was a dispute.
- exploring a mechanism that enables the Fair Work Commission to specifically authorise an alternative enforceable term or limit an excessive term.



Recommendation 7.16 **Review of recent bargaining changes**

The review of the *Fair Work Legislation Amendment (Secure Jobs, Better Pay) Act 2022* (Cth) should particularly focus on the:

- degree to which it has promoted single-enterprise bargaining and achieved productivity-enhancing improvements in workplaces
- use of multi-enterprise bargaining and its effect on wages, prices, competition, and productivity
- potential need for further clarification on elements reliant on the Fair Work Commission's discretion.



Recommendation 7.17 **Disentangle enterprise agreements from awards**

The Australian Government should explore methods to further loosen the relationship of enterprise agreements with awards when there is genuine agreement between employees and employers. This should include an amendment to the Better Off Overall Test such that even if some employees are worse off from a change in an agreement, the Fair Work Commission could nevertheless approve an agreement if a range of public and private interest tests were met, including the degree to which the benefits to winners are larger than the losses to losers.

Any changes should have adequate protections in place to avoid undesirable outcomes as exemplified by the *Construction, Forestry, Mining and Energy Union v One Key Workforce Pty Ltd* case.

Reform directive 12: Regulation that works with new workforce models



Recommendation 7.18

Introduce independent dispute resolution for platform workers

The Australian Government should introduce an external, independent dispute resolution function within the Fair Work Commission that can provide conciliation and arbitration services relating to suspension or termination disputes or non-payment of earnings. The function should be funded by platforms and should be designed to encourage platforms to improve internal processes, rather than relying on the external body as the primary method of resolving disputes.



Recommendation 7.19

Evaluate insurance arrangements for platform work where there are significant risks to workers

Governments should evaluate insurance arrangements of classes of platform work where there are significant risks to worker safety, drawing on data and consultation with platforms, workers and their representatives. Classes of platform work that are likely to be of initial interest are those with many workers or total hours worked and those where there are material risks to work health and safety.

Where insurance arrangements are insufficient, governments should consider at minimum mandating a baseline level of insurance to be provided and paid for by platforms, or creating an industry-wide insurance scheme, or extending workers compensation. Each of the policy options would be best funded by the covered platforms. The appropriate policy option will depend on the class of platform work and its risks, and implementation considerations such as the existing level of insurance provided by platforms and the financial sustainability of the scheme.

Harnessing data, digital technology and diffusion



Innovation policy should broaden and give more emphasis to the spread and adoption of new technology and best practice. In particular, adoption of digital technology, such as AI, and the better use of data by businesses can boost productivity and be encouraged by government action. Reforms are proposed to further extend data sharing, improve funding of digital infrastructure and streamline cyber reporting regulation.

Reform direction 13: Faster and more reliable internet access to underpin productivity growth in regional Australia



Recommendation 4.1

Better access to digital infrastructure in regional communities by improving funding mechanisms

The Australian Government should more efficiently and transparently fund digital infrastructure investments to motivate improved provision in Australia's regional communities.

This would ultimately require a transition in funding arrangements from the current patchwork of programs to a single market-based tender mechanism for delivering the Universal Service Guarantee, once the market for internet connectivity services across all technology types (fixed line, mobile, satellite) is sufficiently competitive to support such an arrangement.

The government should request that the Australian Communications and Media Authority and/or the Australian Competition and Consumer Commission undertake market testing to understand whether it is currently feasible or, if not, when technology improvements and new market entrants would enable a more efficient tender mechanism to be implemented.

In the meantime, governments should improve transparency about how funding is allocated for existing regional digital infrastructure programs, including publishing the reasons for funding decisions and evaluating the outcomes of previous investments.

Reform direction 14: Cyber security compliance arrangements to underpin a productive digital economy

» Recommendation 4.5 **A single interface for cyber incident reporting**

The cost for businesses of complying with cyber security regulations should be reduced by streamlining incident reporting requirements, with all reporting to occur via a single online interface. The operating system underlying this interface would then direct reports to the Australian Cyber Security Centre or other relevant government agency as required. This could provide the platform for the government to work with cyber security software providers to build incident reporting functions into commonly used software, so that reports are automatically sent to relevant agencies if an incident occurs.

Reform direction 15: Maximise the value of government-collected or funded data holdings

» Recommendation 4.2 **Expanding use cases for the Australian Government Digital Identity**

The Australian Government, working with the Council on Federal Financial Relations, should increase access to its Digital Identity so that State and Territory Government services that require identity verification (such as applying for a driver's licence) and private sector services that require identity verification (such as opening a bank or utility account) are able to use the system, with appropriate access controls and safeguards.

Governments should work towards adopting a single national digital identity, rather than different jurisdictions having fragmented identity systems that require citizens to verify their identity with governments and businesses through different channels.

» Recommendation 4.3 **Private sector access to government data**

The Australian Government should enable government data to be securely shared with the private sector, so that not-for-profit organisations and businesses can undertake research and develop improved products and services for Australians.

This could be enabled by extending the *Data Availability and Transparency Act 2022* (Cth). Extension could be gradual, starting with accredited private organisations using the data for policy and research purposes to achieve social objectives, before being opened for accredited businesses to use the data commercially. Appropriate safeguards should be employed to ensure security and privacy concerns are addressed, and the government could consider utilising advances in technology for individual privacy preservation.



Recommendation 4.4 Sharing data from government-funded services

The Australian Government should increase the safe sharing and use of data collected by government-funded service providers, including community, not-for-profit and private organisations. This would include identifying relevant data that could be safely shared and linked to benefit individuals receiving services, setting technical standards for data sharing to promote interoperability, and using funding levers to incentivise service providers to gather and share data that could improve service delivery and productivity.

Healthcare data should be targeted in the first instance to enable wellbeing benefits for individuals and productivity benefits at the practitioner and system levels. This could be implemented using My Health Record (MHR) as the foundation for a comprehensive data sharing system, and include provisions for:

- opting out of the system: Where consumers have not exercised their right to opt out of the system, practitioners should be required to upload agreed relevant health records to MHR. Patients that opt out should be required to confirm their decision each year after discussing with their general practitioner
- health software compatibility and standards: In the short term, the Australian Government should publish a register of health practice software that is integrated with MHR. In the medium term, it should set conformance standards that require all health practice software to be compatible with MHR to enable ready uploading of relevant records to MHR and extraction of patient data in an easy-to-use, secure and transferable format. The standards should also include consistent language and terminology, and a secure gateway to enable practitioners using different software to connect with each other
- de-identification to support system planning: The Australian Government should, in consultation with healthcare practitioners and the community, develop a framework for using the data in MHR in a de-identified way for health system-wide planning and policy development.

To support seamless service delivery, safe sharing of data held by government-funded service providers outside of healthcare — such as school education, childcare, aged care, criminal justice, community services and infrastructure contracts — should also be investigated and facilitated by the Australian Government.

Reform direction 16: Actively promote the diffusion of new knowledge and best practice across the business community



Recommendation 5.1 An enabling environment for small business access to finance

The Australian Government should monitor the effects of APRA's changes to capital requirements and risk weights for loans to small and medium enterprises (SMEs) that are not secured by property, and the activities of the Australian Business Securitisation Fund, to understand whether they are having the desired impacts on SME lending. Adjustments or further responses could be required if barriers to SMEs accessing finance remain. APRA may need to collect more detailed data about business lending to enable the government to undertake this monitoring.



Recommendation 5.2

An industry-agnostic approach to the National Industry PhD Program

The Australian Government should actively promote innovation diffusion across a range of industries as part of its role in capability building. By adjusting the National Industry PhD Program so that it is industry ‘agnostic’ and does not preference applications aligned with the National Manufacturing Priorities, the Government could encourage diffusion of new knowledge and best practice into the services and social sciences.



Recommendation 5.3

Improving collaborative networks and knowledge transfer

Governments could strengthen collaborative networks for diffusion and facilitate knowledge transfer through:

- trialling government-funded extension services, which have so far been focused on the agriculture industry in Australia, to support diffusion of technical knowledge and relevant technologies in other sectors. The initiative should be tailored by sector depending on what services are relevant for most small businesses in that sector, with early engagement between government and businesses to identify the types of services that would be most beneficial
- requiring open access for government funded research in journals, papers and publications that is currently locked behind paywalls. In implementing this change, the government should compare the benefits and costs of the Chief Scientist’s proposed open access model with the benefits and costs of other potential approaches
- partnering with intermediaries — such as industry associations and other advisory or network bodies — that have existing connections between industry, government, researchers and markets when implementing programs to support diffusion (such as capability development initiatives and extension services). This would enable governments to reach a wider audience with their diffusion initiatives.



Recommendation 5.4

Reducing administrative barriers to academic consulting

The Australian Government should reserve the right to facilitate more consulting by university academics, should universities be unable or unwilling to lower unnecessary administrative barriers that disincentivise academics from undertaking consulting. This could be incorporated into the Australian Universities Accord, with the government setting guiding principles to govern universities’ approaches to academic consulting and standardised processes and fee requirements.

**Recommendation 5.5****Using government-held data for benchmarking purposes**

Government agencies should use data they collect to help businesses benchmark their performance and provide insights that promote diffusion of best practice.

- Existing efforts to provide data collected from businesses back to businesses for performance comparison purposes, such as those by the ABS, ATO and ABARES, should be extended — for example, by making benchmarking tools with tailored results accessible online, or by accompanying benchmarking results with other analysis such as case studies on best practice.
- Other opportunities to use government-held data for benchmarking should be explored, including in specific sectors where applicable (for example, APRA and ASIC data for financial services and ACCC data for various consumer products).

**Recommendation 5.13****No-cost or low-cost access to ideas that have large public good value**

To support the diffusion of best practice and knowledge that has already been generated by innovative businesses, not-for-profits and government organisations, the Australian Government should:

- make mandatory standards freely available and look at new funding models for Standards Australia to reduce or eliminate the pricing of voluntary standards that have high public good value
- require open access to research principally funded by governments (see recommendation 5.3 of this report for further detail)
- reform fair use provisions in intellectual property regulations to adopt a principles-based fair use exception.

Creating a more dynamic economy



A dynamic economy is a proven ‘machine’ for spreading innovations. Proposed reforms to boost competition, business entry, investment and dynamism go beyond general competition law to include general settings like tax, trade and regulation (e.g. planning).

A proposed generational review would focus on Australia’s fragmented private and social insurance arrangements, where short-term changes can pave the way for substantial long-term reform.

Technology-enabled pricing is a big emerging opportunity. Incremental reforms to apply it to transport can boost productivity through better infrastructure decisions and improving mobility.

Reform directive 17: Create a risk protection system that encourages entrepreneurship and a long-term view



Recommendation 3.1

A generational review and reform process for Australia’s risk protection ‘system’

Government could commence a review of Australia’s risk protection and social insurance arrangements, focusing on:

- encouraging individual entrepreneurship
- removing barriers to innovative service models by insurers
- fostering efficient mitigation and early intervention.

In the near term, incremental gains could be made by progressing:

- abolition of stamp duty on insurance premiums
- continued incremental expansion of the range of out of hospital services that private insurers can fund
- targeted exemptions from risk equalisation for innovative, evidence-based preventative initiatives by health insurers
- greater flexibility for life insurers to fund (on a discretionary basis) some approved health-like services, particularly in areas like mental health
- increased sharing of government held or funded data, particularly data collected through health providers (recommendation 4.4)
- continued exploration of the ‘insurance approach’ in government programs through measures such as payment by results, social impact bonds, actuarial evidence and innovation funds.

Reform directive 18: Create an investment environment that allows the right activities to occur in the right places



Recommendation 3.2 More flexible and streamlined planning and zoning

State and Territory Governments should revise their planning regulations to ensure residential, commercial and industrial zoning is not unduly restrictive. This should include:

- implementing standardised business, and industrial zones across local government areas
- aggregating existing business and industrial zones to reduce the number of zones where possible and to broaden the range of permissible activities
- ensuring that urban planning decision-making processes consider the introduction of competition to incumbent businesses as a positive outcome.



Recommendation 3.5 The next steps toward road user charging

Australian governments should work towards an intergovernmental agreement on road user charging for all vehicle types, focusing on distance-priced charging including any road damage premiums, and subsequently, incorporating congestion charges for crowded roads. The agreement should set out the roles of the different level of governments, how road funds and trials should be implemented, and the appropriate transition pathway away from fuel excise.

In developing a new pricing regime, Governments should consider the inclusion of compulsory third party insurance costs in distance-based charges and menu options for motorists to choose between higher distance-based charges and lower fixed charges.

The appropriate level of distance-based and fixed road charges, and the desirable extent of exemptions and concessions, should be based on trials and the experiences of overseas jurisdictions that have already employed them.

Ultimately, governments should work towards the longer-term objective of more efficient pricing of road use, including through the use of congestion charging in urban centres.



Recommendation 3.6 More efficient public transport fare settings

Public transport fares across all states and territories should apply the pricing framework used by the NSW Independent Pricing and Regulatory Tribunal, including consideration of fares that take into account peak-time crowding, reduced road congestion, distance-based charges and fares that reflect the lower costs of buses compared with trains.

States and territory governments without independent bodies to make jurisdiction-specific recommendations should improve fare setting through other channels, such as publishing pricing strategies and rationales for decisions, and increasing fares annually by growth in public transport costs.

Reform directive 19: Address lack of competitive market incentives in highly regulated sectors



Recommendation 3.3

Improve competitive pressures in highly regulated sectors

The Australian Government should remove impediments to competitive pressures in sectors where it has a substantial regulatory footprint. In the first instance, this could include:

- assessing the implications for competition, health outcomes and productivity of regulatory arrangements in private health insurance, as part of the generational review of Australia's risk protection and social insurance arrangements (recommendation 3.1)
- removing anti-competitive regulations on the ownership and location of pharmacies.

Other sectors where the Government has a large regulatory footprint should similarly and subsequently be examined to remove any impediments to competitive pressures that are not supporting a broader social or environmental policy objective.

Reform directive 20: Transition tax system incentives to invigorate productivity growth



Recommendation 3.4

Transition the tax system to reinvigorate productivity growth

In their use of the tax system for fiscal consolidation over the next decade, governments should, including through the Council on Federal Financial Relations, systematically transition the tax system to be supportive of productivity growth through tax arrangements that:

- promote skilled labour supply
- improve tax neutrality in respect of savings and investment
- encourage efficient asset transfers and capital allocation
- foster market entry and competition
- support efficient risk management by firms and individuals.

Reform directive 21: Pursue economic resilience through open trade and foreign investment



Recommendation 3.7 Pursue trade resilience through openness

The Australian Government should pursue economic resilience by harnessing open trade. Public interventions in vulnerable and critical supply chains should be considered as a last resort, given the incentives for and capacity of private businesses to manage supply chain risks. Calls for assistance in vulnerable and critical supply chains should be subject to assessment of economy-wide net benefits by the Office of Supply Chain Resilience, with some form of transparent, public reporting on the justification and/or costs of any intervention.



Recommendation 3.8 More open trade and greater recognition of international standards

The Australian Government should promote open and resilient trade in goods including by:

- reducing Australia's statutory import tariff levels to zero
- progressively removing Australia's anti-dumping and countervailing measures, and subjecting any new measures to an economy-wide cost-benefit test.
- increasingly accepting product standards adopted in other leading economies as 'deemed to comply', provided that a transparent review could be undertaken in cases where the Australian Government identified a significant safety risk.



Recommendation 3.9 Addressing potential chilling effects of the Foreign Investment Review Framework

While the Australian Government should ensure its Foreign Investment Review Framework is fit for its purpose in addressing fraud and strategic risks, its design should be cognisant of the potential chilling effects on investment and subsequent costs to productivity. Application fees for proposed foreign direct investment (FDI) should not be used as a tax base.

More specifically, application fees for proposed FDI into agricultural land assets should be brought closer into line with other forms of investment, including by:

- applying indexation to the threshold investment value, as is done with most commercial investments
- adjusting the fee tiers so as to reduce the marginal rate fee as a proportion of the investment amount.



Recommendation 3.10

Prepare for increased global trade in services

In order to ensure the Australian economy is well-placed to benefit from the global increase in trade in services, Australian governments should reduce barriers to trade in services both 'at the border' and 'behind the border'. This will require consideration of not only trade policy (recommendations 3.7 and 3.8), but also tax settings (recommendation 3.4), occupational licensing (recommendations 7.9 to 7.12), foreign direct investment (recommendation 3.9), improved recognition of overseas qualifications (recommendations 7.7 and 7.8) and temporary migration settings (recommendation 7.5).

Lifting productivity in the non-market sector



Governments should persevere with the hard work of driving innovation and spreading good practice in their own services. Reforms to funding models will be a key enabler of service innovation.

The innovation 'ecosystem' in much of the non-market sector is incomplete. Reforms focus on strengthening the role of public bodies to spread ideas and best practice; more transparency and better use of data to inform consumers, funders and regulators.

Health reform is a work in progress; next steps toward integrated patient-centred, data enabled care can drive long-term productivity benefits.

Reform directive 22: Implement best practice resource allocation when funding public infrastructure



Recommendation 5.7

Collaborative procurement on major projects to increase productivity

The Australian, State and Territory Governments should improve the quality and productivity outcomes of public infrastructure projects by increasing the use of alliance contracting or collaborative contracting for major projects, so that contractors are involved earlier in the planning and scoping stages of a project. This could also include building incentives into contracts for the achievement of certain targets or standards.



Recommendation 5.8

Improving the efficacy of public expenditure through better investment decisions

Governments can improve the efficacy and productivity outcomes of public expenditure through institutional and governance arrangements that address the systemic absence or disregard of rigorous cost-benefit analysis (CBA) for both major infrastructure projects and in other government activities, such as defence and social services. Such arrangements should include:

- independent evaluation of the assumptions and inputs used in a CBA, which could be undertaken by a single institution across the State, Territory and Commonwealth levels to support consistency and comparability across different projects and programs. The proposed Evaluator General at the Commonwealth level could be a starting point for this improvement
- transparency about the analysis, including on cost and benefit estimates and forecasts and scenario selection, with independent assessments to be published and provided to government decision makers before an investment decision is made
- government officials aligning their investment decisions with CBA results, and being held accountable for how the CBA outcomes are used — or not used — in project selection.

Reform directive 23: Using health funding approaches to diffuse innovations



Recommendation 5.6

Using health and human service funding approaches to improve diffusion

Governments should use their funding and procurement approaches to drive improved efficacy, innovation and diffusion in health and human services that they deliver or contract external service providers to deliver. This could include:

- improving the diffusion of good practice in primary healthcare by regularly updating the Medicare Benefits Schedule (MBS) to reflect effective treatments. The Medical Services Advisory Committee (MSAC) should be required to undertake an annual rolling review of selected MBS items, focusing on treatments where emerging evidence or clinician feedback questions their efficacy or cost effectiveness. The Australian Government should assess the need for higher levels of funding for MSAC to undertake these annual reviews as a standing function
- implementing funding models that support the diffusion of innovation in healthcare, including preventative care, and a more patient-centred approach by aligning incentives across different parts of the health system. This includes by accelerating and scaling up long-term co-operative funding mechanisms that align the incentives of primary and hospital providers to avoid costly hospital admissions and support integrated care, such as capitation models that have demonstrated success and other mechanisms supported by the Independent Hospital and Aged Care Pricing Authority. Governments should also seek to overcome obstacles to implementing co-operative models, such as changing the *Health Insurance Act 1973* (Cth) and improving data sharing
- encouraging human service providers to innovate and compete to meet consumers' needs by providing citizens with more control over how government funding allocated to these services is spent. This could apply to the allocation of housing assistance to people rather than properties, end-of-life care, public dental services and healthcare
- increasing default contract lengths to 5–7 years for government-funded services delivered by community organisations to support innovation and diffusion. Suitable contract lengths will depend on the type of service provided, and the lengths of contracts that are retendered could be reconsidered upon their expiry.



Recommendation 5.11

A bigger role for diffusion bodies

Expand or strengthen the role of existing diffusion bodies — such as the Australian Commission on Safety and Quality in Health Care, Aged Care Research and Industry Innovation Australia, Australian Education Research Organisation, CSIRO and Australian National Audit Office — with the aim of disseminating best practice, including the elimination of practices no longer underpinned by adequate evidence. Trial innovation funds in selected public services where there is no existing body for diffusing best practice, such as in mental health service delivery.

Reform directive 24: Promote innovation and diffusion within government agencies and regulators



Recommendation 5.9

Using performance data on government services to diffuse best practice

Governments should collect and use data on service outcomes and provider performance to benchmark their own service delivery and diffuse best practice. This should go beyond simple descriptive performance comparisons by providing more like-with-like comparisons, so that governments and service providers can understand what is driving differences in performance and how, when not justified, these differences could be narrowed.



Recommendation 5.10

Recruiting public sector workers from overseas to bring in global best practice

Improve the diffusion of global best practice in the public service by loosening the security and citizenship requirements, and overly bureaucratic processes, which currently limit the recruitment of workers from outside Australia who bring innovative ideas and different models to the public service. This could include expedited security approval processes for overseas workers who have already obtained similar levels of security clearance in their home country, where Australia has a security or intelligence agreement with that country (for example, the Five Eyes alliance).



Recommendation 5.12

Encouraging regtech development and diffusion

Governments should support greater use of productivity-enhancing regtech by:

- providing regulation in forms that lend themselves to regtech solutions, such as coding regulatory rules into machine-interpretable documents, like the NSW Government's machine-readable version of the *Community Gaming Regulation 2020*. New regulations that are likely to be amenable to a regtech solution should be implemented in a machine-interpretable format at the outset, to avoid the need to go back and codify such regulations in the future
- working with software providers to identify areas where they could improve foundational settings to encourage industry to design compliant regtech solutions. The Fair Work Commission's efforts to develop an application programming interface that enables software providers to directly access its awards database, in co-design with stakeholders, is an example of such an improvement.

Securing net zero and adapting to a changing climate at least cost



Adapting to climate change and achieving net zero at least cost will be key determinants of Australia's future productivity performance.

Proposed reforms make use of existing policy levers — broadening and strengthening the safeguard mechanism, maximising confidence in the integrity of offsets, and ensuring individuals and businesses have the necessary information to make decisions that reduce their future climate adaptation costs.

Reform directive 25: Create policy settings that enable and respect private adaptation decisions



Recommendation 6.1 Avoid government subsidised reinsurance schemes

Australian governments should avoid expansion of climate-related insurance sector interventions and set a medium-term time frame for the phase out of the Northern Australia Reinsurance Pool. Government interventions in private insurance markets risk subsidising the movement of individuals, households, and businesses into harm's way, and increasing overall adaptation costs. Setting a medium-term time frame for the phase out of the Northern Australia Reinsurance Pool would provide time for private insurance providers to secure alternative reinsurance services.



Recommendation 6.2 Helping to inform adaptation investment decisions

Households and businesses should be provided with the information they need to make informed adaptation decisions. State and Territory governments should mandate the pre-sale disclosure of climate risks for all residential and commercial property sales.

- Such disclosure should be based on existing climate change projections and cover a range of physical risks including riverine flooding, sea level rise, subsidence, fire and other natural disasters.
- This disclosure could operate in the same way that States and Territories mandate the pre-sale disclosure of building reports.

For new greenfield developments the cost of climate risk reduction measures should be incorporated into the price of buying into the new development, through mechanisms like developer levies, which will help ensure that future residents face cost-reflective pricing.

**Recommendation 6.3****Transitional assistance should not distort adaptation decisions**

If transitional assistance is provided to climate-impacted regions, industries, and workers, it should be structured in a way that lets people decide which regions, sectors, and occupations they are best placed to transition into. It should not be made conditional on recipients committing to live or work in a particular region, sector, or occupation.

**Recommendation 6.4****Cost-benefit analysis for adaptation-related infrastructure projects**

Proposed adaptation-related infrastructure projects (including projects to rebuild or relocate communities impacted by large scale natural disasters) should be subject to rigorous cost-benefit analysis that incorporates plausible climate projections over the projected life of the asset and compared with that of alternative options. In the case of community rebuilding proposals, a rigorous cost-benefit analysis would consider the broad range of costs and benefits - cultural, social, economic, and environmental - of rebuilding in-situ with increased defensive measures, relative to rebuilding in an alternative location.

Reform directive 26: Elevate the Safeguard Mechanism to be Australia's primary emissions abatement mechanism

**Recommendation 6.5****Make the Safeguard Mechanism Australia's primary emissions abatement mechanism**

To increase certainty, reduce investment risk, and promote least-cost abatement, the Australian Government should progressively make the Safeguard Mechanism (SM) Australia's primary economy-wide abatement mechanism. To this end, the Government should collectively implement the following changes to the SM over time:

- define SM baselines, the total amount of annual net emissions that captured facilities are allowed to produce, in absolute emissions terms, not emissions intensity terms
- expand SM coverage by reducing SM facility thresholds, the total amount of annual emissions that a facility can produce before becoming subject to the SM, from 100,000 to 25,000 tonnes of CO₂-e
- impose SM baselines on individual electricity generators, not at the sectoral level. Failing that, the sectoral baseline for the grid connected electricity sector should be reduced, removing the bulk of the headroom between current emissions and the sectoral baseline, though this would not have the same efficiency benefits as directly including individual electricity generators in the SM
- expand transport sector coverage: once electricity generators are covered at facility level, the SM should be extended to liquid fuel wholesalers, with downstream vehicle emissions imputed to them
- allow generation of sub-baseline abatement credits. If SM baselines are expressed in absolute emissions terms, SM facilities should be allowed to generate emissions credits for emissions abatement below their SM baseline.
- no additional Emissions Intensive Trade Exposed Industries (EITEIs) protections should be provided through the SM. The SM already provides the majority of emissions rights for free, and will continue to do so for the foreseeable future.

Reform directive 27: Increase the integrity of carbon offsets



Recommendation 6.6

Increase the integrity of carbon offsets recognised by the Safeguard Mechanism

To make emissions reductions credible, the Australian Government should discontinue the 25-year permanence period for sequestration-related ACCU projects, introduce an additional class of sequestration-based ACCUs that align with the more enduring permanence provisions of the biodiversity market, and publish offset reports and project audit reports required by the Clean Energy Regulator. State and Territory Governments should stipulate the proportion of biogas that needs to be captured by existing ACCU-generating landfill gas capture projects under existing regulations.

Reform directive 28: Remove emission reduction measures that are not complementary to the Safeguard Mechanism



Recommendation 6.7

Phase out policy measures not complementary to the Safeguard Mechanism

Policy measures that are not complementary to the Safeguard Mechanism (SM) should be phased out to lower the overall cost of abatement. A review of existing measures should be undertaken to assess their complementarity to a reformed SM and recommend a timetable for the removal of non-complementary measures identified by the review. A 'complementary measure' would be one that either drives emissions abatement from emissions sources not covered by the SM, addresses market failures that constrain the pursuit of abatement from emissions sources covered by the SM, or deliver broader non-carbon abatement related benefits. Remaining non-Safeguard Mechanism policies should (1) stipulate how they are complementary to the SM, and (2) have their estimated abatement costs independently estimated and made public.

Reform directive 29: Pursue a least-cost approach to securing electricity supply



Recommendation 6.8

Pursue a least-cost approach to securing electricity supply

The proposed Capacity Investment Scheme should be implemented with a five-year sunset clause, and independently reviewed ahead of any decision to extend its life. It should be implemented on a technology neutral basis, allowing for both supply and demand-side participation by households and businesses.

A Inquiry conduct and participants

This appendix describes the stakeholder consultation process undertaken for the inquiry and lists the organisations and individuals who have participated.

Inquiry terms of reference

The terms of reference for the inquiry was received from the Treasurer on 7 February 2022 and is viewable on the inquiry website. The inquiry was advertised in *The Australian* on the 14 February 2022.

Engagement with inquiry participants

The Commission issued a call for submissions paper on 21 February 2022. From August to October 2022, it released six interim reports outlining its early analysis and reform directions in inquiry topic areas. Throughout the inquiry, the Commission held and benefited from the following consultation processes:

- Four roundtables (table A.4)
 - Tertiary education
 - Migration
 - Digital, data and innovation
 - Modelling
- Two days of public hearings (table A.5)
 - Melbourne (7-8 November)
 - Hearings were advertised in *The Australian* on 26 October 2022 and through an email to registered inquiry participants
- About 150 meetings were held with stakeholders across Australia (table A.3)

The Commission received 203 public submissions during the inquiry and also provided facilities on the inquiry website for interested stakeholders to lodge a brief comment (tables A.1 and A.2).

Table A.1 – Number of submissions and comments received

	Pre-interim reports	Post-interim reports	Total
Submission	74	129	203
Comments	2	15	17

Table A.2 – Submissions received

Participants	Submission no.
88.io	183
Actuaries Institute	93
Adrian Foley	130
Ahton de Silva, Emmauelle Walkowiak, Maria Yanotti, Sarah Sinclair, and Sveta Angelopoulos	125
AIA Australia	30
Alphacrucis University College (AC)	133
Animal Medicines Australia	39
APSCo	202
Associate Profess Chris Wright	100
Associated of Retired Principals of Technical Institutions	95
Association of Heads of Independent Schools of Australia (AHISA)	172
Ausfilm	48
Australasian Council of Deans of Arts, Social Sciences and Humanities (DASSH)	141
Australasian Railway Association (ARA)	65
Australian Academy of Science	200
Australian Academy of Technological Sciences and Engineering (ATSE)	8, 89, 98
Australian Aluminium Council	131
Australian Automobile Association (AAA)	6
Australian Bureau of Statistics (ABS)	127
Australian Chamber of Commerce and Industry (ACCI)	47, 175
Australian Commission on Safety and Quality in Health Care (ACSQHC)	9
Australian Communications Consumer Action Network (ACCAN)	118
Australian Competition & Consumer Commission (ACCC)	72
Australian Constructors Association (ACA)	73, 105
Australian Council of Deans of Education Vocational Education Group (ACDEVEG)	116
Australian Council of Deans of Health Sciences (ACDHS)	153
Australian Digital Health Agency	145
Australian Digital Inclusion Alliance	96
Australian Education Union Federal Office	21
Australian Energy Council (AEC)	161
Australian Healthcare and Hospitals Association (AHHA)	27, 176
Australian HR Institute (AHRI)	54
Australian Industry Group (Ai Group)	43, 179
Australian Information Industry Association (AIIA)	76, 180
Australian Institute of Company Directors	44
Australian Institute of Teaching and School Leadership (AITSL)	146

Participants	Submission no.
Australian Investment Council (AIC)	63, 71, 83, 84, 135
Australian Learning Lecture	124
Australian Local Government Association (ALGA)	61, 132
Australian Mobile Telecommunications Association (AMTA)	163
Australian Research Data Commons (ARDC)	164
Australian Skills Quality Authority (ASQA)	149
Australian Small Business and Family Enterprise Ombudsman (ASBFEO)	64, 165
Australians for Northern Development & Economic Vision (ANDEV)	3
Ben Blackburn Racing	74, 81
Beyond Blue	15
Bill Ranken	148
Black Dog Institute	24
BSA The Software Alliance	134
Bupa	69
Business Council of Australia (BCA)	16, 181
Business Excellence Australia	32, 136, 159
Career Development Association Australia (CDAA)	104
Catholic Health Australia	78
Centre for Independent Studies	42
Chemistry Australia Ltd	35
Christopher O'Donnell, Professor	40
Civic Contractors Federation	38
Commercial Radio Australia	12
Complementary Medicines Australia & The NICM Health Research Institute – Joint	29
Consult Australia	28
Consumer Policy Research Centre (CPRC)	19, 115
Cooperative Research Australia (CRA)	194
Country Universities Centre	119
CPA Australia	94, 106
CSIRO	128
Customer Owned Banking Association (COBA)	62
David Wadley	178
Department of Finance	123
Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA)	201
Desmond Griffith	143
Digital Service Providers Australia New Zealand (DSPANZ)	18

Participants	Submission no.
Dr Ann Villiers	107
Dr Holly Randell-Moon	85
Dr Ian Cornford	150
Dr Tom Karmel	197
Early Learning and Care Council Australia; The Front Project and Australian Childcare Alliance – Joint	34
eBay Australia and New Zealand	114
Electrical Trades Union of Australia (ETU)	103
Energy Skills Australia	99
Engineers Australia	85
eSafety Commissioner	87
Financial Services Council (FSC)	53
Financial Services Institute of Australasia (FINSIA)	68
Gary McLaren	137
Gemaker	13
Geoffrey Taperell	5
Global Sisters Limited	46
Graham Bary	11
GrainGrowers	193
Grattan Institute	37
Grok Academy	185
Group of Eight	187
GSK Australia	14
Hireup	109
Independent Higher Education Australia (IHEA)	111, 120
Infrastructure Victoria	10
Innovative Research Universities (IRU)	177
Institution of Chemical Engineers (ICChemE)	101
Insurance Council of Australia (ICA)	59, 203
Internet Association of Australia (IAA)	168
IPA-Deakin SME Research Centre (IDSRC)	31
Isolated Children's Parents Association of Australia Inc (ICPA)	156
JCSF Consulting Pty Ltd	97
Jenny Gordon, Dr	17
John Dahlsen	1
John O'Donnell	91
Kevin Cox	75
KPMG	60, 192

Participants	Submission no.
La Trobe University	182
Large Format Retail Association (LFRA)	142
Local Government Elected Members Association Inc. (LGEMA)	4
Mable Technologies	152
Master Builders Australia (MBA)	58, 190
Medicines Australia	126
Minerals Council of Australia (MCA)	55
Monash Q Project – Monash University	160
Monash University	184
MTC Australia	140
MYOB	198
National Electrical and Communications Association (NECA)	108
National Farmers' Federation (NFF) and Regional, Rural and Remote Communications Coalition (RRRCC)	167
National Rural Health Alliance	110
National Tertiary Education Union (NTEU)	36
NBN Co	147
Office of the Australian Information Commissioner	173
Per Capita Australia	162
PEXA	82
Pfizer Australia	129
Phillip Hone	77
Primary Focus	56
Professor John Quiggin	102
Professor Julia Horne	169
Professors' Nicholas Biddle and Matthew Gray	155
Property Council of Australia	49
Queensland Nurses and Midwives Union (QNMU)	41, 90
Ray Johnson	117
Regional Development Australia Tasmania (RDAT)	189
Regional Universities Network (RUN)	154
Richard Caladine	113
Roads Australia	25
Roads Australia	151
Robert Wildermuth OAM	199
Ronald Jackson	171
Salesforce	80
Science and Technology Australia	188
Seer Data and Analytics	139

Participants	Submission no.
Self-Employed Australia (SEA)	170
Shopping Centre Council of Australia	45
Simon Kwok	138
Smartsat CRC	144
Tabcorp	57
Tasmanian Government	196
Tasmanian Small Business Council (TSBC)	20
Teachers and Teaching Research Centre (TTRC)– University of Melbourne	122
Technology Council Australia	51
TechnologyOne	66, 79
Telstra Corporation	174
Tenfold Australia	23
The Chamber of Minerals & Energy of Western Australia (CMEWA)	52
The Citizen's Dividend Organisation	2
The Honourable Reg Hamilton	50
The Medical Technology Association of Australia (MTAA)	33
The Pharmacy Guild of Australia	67, 112
The Smith Family	26
Universities Australia (UA)	70, 195
University of Melbourne	186
University of Melbourne Graduate Student Association (GSA)	158
University of Technology Sydney (UTS)	92
Urban Taskforce	88
VETASSESS	157
Vocus Group Ltd	121
Volunteering Australia	22, 166
William Merrilees	7
WiseTech Global	191

Table A.3 – Consultations

Participants
ACT Government, Chief Minister, Treasury and Economic Development Directorate
Alastair Hick
American Chamber of Commerce In Australia
Australian Constructors Association (ACA)
Associate Professor Tim Higgins, The Australian National University

Participants

Associate Professor Wayne Geerling, Monash University

Atlassian

AusIndustry

Australian Banking Association

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

Australian Bureau of Statistics (ABS)

Australian Council of Education Research (ACER)

Australian Digital and Telecommunications Industry Association (ADTIA)

Australian Digital Health Agency (ADHA)

Australian Education Research Organisation (AERO)

Australian Education Union

Australian Energy Market Operator (AEMO)

Australian Healthcare and Hospitals Association (AHHA)

Australian Human Resources Institute (AHRI)

Australian Information Industry Association (AII)

Australian Institute of Teaching and School Leadership

Australian Investment Council (AIC)

Australian Medical Association (AMA)

Australian Mobile Telecommunications Association (AMTA)

Australian Prudential Regulation Authority (APRA)

Australian Retailers Association (ARA)

Australian Skills Quality Authority (ASQA)

Australian Small Business and Family Enterprise Ombudsman (ASBFEO)

Australian Taxation Office (ATO)

Australian Technology Network of Universities (ATN)

Australian Tutoring Association

Bao Hoang

Business Council of Australia (BCA)

Calix

Canberra Goulburn Catholic Education Office

CarbonAbility

DoorDash

Dr Char-lee McLennan, QUT Business School

Charles Cornish, Tabula Rasa Health Care

Chartered Accountants Australia & New Zealand (CA ANZ)

Participants

Cicada Innovations

Claire Field & Associates

Climate Risk

Committee for Economic Development of Australia (CEDA)

Commonwealth Bank of Australia

Community Colleges Australia (CCA)

Consult Australia

Cooperative Research Centre (CRC)

Council of Small Business Organisations Australia (COSBOA)

CSIRO Data 61

Curtin Research Centre

Deloitte Access Economics

Department of Agriculture, Water and the Environment

Department of Climate Change, Energy, the Environment and Water (DCCEEW)

Department of Education, Skills and Employment (DESE)

Department of Finance

Department of Foreign Affairs and Trade (DFAT)

Department of Employment and Workplace Relations (DEWR)

Department of Home Affairs

Department of Industry, Science and Resources (DISR)

Department of Industry, Science, Energy and Resources (DISER)

Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA)

Department of Prime Minister and Cabinet (PM&C)

Department of The Treasury

Digital Skills Organisation (DSO)

E61 Institute

Emeritus Professor Bruce Chapman AO, The Australian National University

Equinix

Education Services Australia

Evidence for Learning, Social Ventures Australia

Fair Work Commission

Finity

Gemaker

Grattan Institute

Group of Eight (Go8)

Participants

Hireup

Higher Education Research Group

Independent Pricing and Regulatory Tribunal NSW (IPART)

Infrastructure Australia

Innovative Research University (IRU)

Interactive Games and Entertainment Association (IGEA)

IP Group Australia

John Howard, Howard Partners

Dr Kean-Seng Lim

Knowledge Commercialisation Australasia (KCA)

Learning First

Martin Bean CBE

Melbourne Accelerator Program`

Microsoft

National Australia Bank

National Centre for Vocational Education Research (NCVER)

National Disability Insurance Agency (NDIA)

National Indigenous Australian Agency (NIAA)

National Skills Commission (NSC)

National Tertiary Education Union (NTEU)

New South Wales Centre for Economic and Regional Development

New South Wales Department of Education

New South Wales Department of Premier & Cabinet

New South Wales Treasury

NT Department of Industry, Tourism and Trade

NT Department of the Chief Minister and Cabinet

NT Department of Treasury and Finance

Office of Industry Innovation and Science Australia

Office of the Chief Scientist

Peter Tulip

Professor Andrew Macintosh, ANU College of Law

Professor Andrew Norton, Practice of Higher Education Policy, Centre for Social Research and Method, Australian National University

Professor Beth Webster, Centre for Transformative Innovation, Swinburne University of Technology

Professor Hugh Harley, School of Economics, University of Sydney

Participants

Professor Peter Dawkins, Mitchell Institute for Education and Health Policy, Victoria University

Professor Richard Holden, UNSW Business School

Professor Stephen Parker, Centre for the Study of Higher Education, University of Melbourne

Professors Alistair Royse and Colin Royse, Ultrasound Education Group, University of Melbourne

Professors Michael Ward and Russell Smyth, Monash University

Queensland Department of Education

Queensland Department of Premier and Cabinet

Queensland Treasury

Regional Universities Network (RUN)

Reputex

Reserve Bank of Australia

Restaurant & Catering Australia (R&CA)

Roller

Royal Australian College of General Practitioners (RACGP)

Sally Thorpe

South Australia Department of Education

South Australia Department of Premier and Cabinet

South Australia Department of Treasury

South Australia Productivity Commission

Sarah Pilcher, Centre for Education and Training, Ai Group

SpeedX

TAFE Directors Australia (TDA)

Tasmanian Department of Education

Tasmanian Department of Premier and Cabinet

Tasmanian Department of State Growth

Tasmanian Department of Treasury and Finance

Teach for Australia

Tech Council of Australia

Tech Policy Design Centre, Australian National University

Tertiary Education Quality and Standards Agency (TEQSA)

The Hon. Fiona Nash, Regional Education Commissioner

The Smith Family

Universities Australia (UA)

University of Technology Sydney – Human Technology Institute

Victorian Department of Education

Participants

Victorian Treasury

Western Australia Department of Education

Western Australia Department of Premier & Cabinet

Western Australia Department of Treasury

World Economic Forum (WEF)

Xero

Table A.4 – Roundtable details and participants
25 October 2022 – Tertiary education

Australian Industry Group (Ai Group)

Committee for Economic Development of Australia (CEDA)

Department of Education

Department of Finance

Emeritus Professor Bruce Chapman AO, College of Business and Economics, Australian National University

Grattan Institute

Independent Tertiary Education Council of Australia (ITECA)

National Centre for Student Equity in Australia

National Skills Commission (NSC)

National Tertiary Education Union (NTEU)

Professor Andrew Norton, College of Arts and Social Sciences, Australian National University

Professor Tom Karmel, Future of Employment and Skills research Centre, University of Adelaide

Regional Universities Network

TAFE Directors Australia

TEQSA

Victoria Department of Jobs, Precincts and Regions (DJPR)

27 October 2022 – Migration

Department of the Treasury

Department of Home Affairs

3 November 2022 – Digital, data and innovation

Atlassian

Australian National University (ANU) Tech Policy Design Centre

Australian Healthcare and Hospitals Association

Australian Retailers Association

Australian Small Business and Family Enterprise Ombudsman

Chartered Accountants Australia and New Zealand

Consult Australia

Consumer Policy Research Centre

Digital Skills Organisation

e61 Institute

Microsoft

Tech Council of Australia

Telstra

UTS Human Technology Institute

Xero

3 November 2022 – Modelling

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

Centre of Policy Studies, Victoria University

Chris Murphy, Arndt-Corden Economics Department, Crawford School of Public Policy, Australian National University

Deloitte Access Economics

Department of the Treasury

Ernst & Young

George Verikios, Department of Accounting, Finance and Economics, Griffith University

Investment NSW

Sally Thorpe

Table A.5 – Public hearings

Melbourne – 7 November 2022

Transport Workers' Union

Mable

Hireup

Pexa

Vocus

Gary McLaren

Community Colleges Australia

Melbourne – 8 November 2022

Australian Constructors Association

TechnologyOne

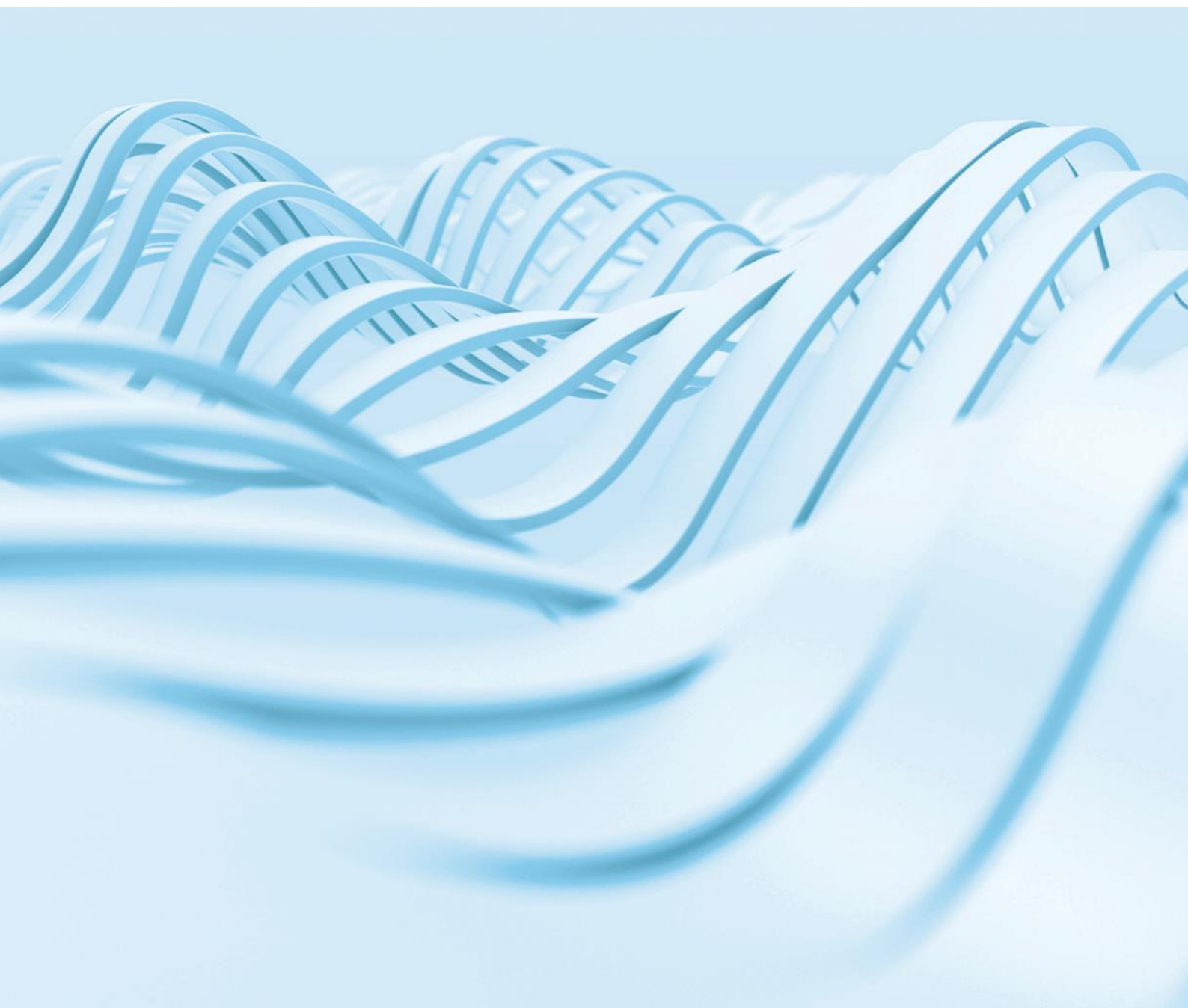
Group of Eight

88.io



5-year Productivity Inquiry: Keys to growth

Inquiry report – *volume 2*



The Productivity Commission acknowledges the Traditional Owners of Country throughout Australia and their continuing connection to land, waters and community. We pay our respects to their Cultures, Country and Elders past and present.

The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Further information on the Productivity Commission can be obtained from the Commission's website (www.pc.gov.au).

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ISSN 1447-1337 (online)

ISSN 1447-1329 (print)

ISBN 978-1-74037-759-1 (set)

ISBN 978-1-74037-761-4 (volume 2)

An appropriate reference for this publication is:

Productivity Commission 2023, *5-year Productivity Inquiry: Keys to growth*, Vol. 2, Inquiry Report no. 100, Canberra

Publication enquiries:

Media, Publications and Web | phone 03 9653 2244 | email publications@pc.gov.au

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The Commission's report is divided into 9 volumes: an overview document (volume 1) that presents our policy agenda, and inquiry content volumes (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda, including a modelling appendix. The full report is available from www.pc.gov.au.

Preface

Productivity is the key to prosperity.

It is the process by which we learn how to get more from less: more and better products — new solutions to meet human needs, produced with less hours of work, fewer resources and a lighter environmental impact.

In essence, productivity growth is about working smarter. The extraordinary rise in average living standards over the past 200 years has come about through the ongoing discovery and spread of new, useful ideas. Some took the form of new technology — like electricity or antibiotics. Others were new business models like mass production or ride sharing. Still others were institutional innovations like accounting standards, capital markets or free trade. Australia has not had to generate all these new ideas, but has benefited from its own ingenuity in raising productivity across the economy, and from diffusing, using and building on others' inventiveness.

What will come next? What should we do to speed the pace of growth, or at least clear a path?

The current 5 year Productivity Inquiry tackles these questions. It builds on the work of the last review, *Shifting the Dial*, released in 2017. It starts with this document, which lays out the context of our productivity challenge: what we have learned from history, what we think is most salient about the present and where we might therefore focus our policy effort.

A key message is that the path and pace of growth is necessarily uneven. Countless innovations have burst onto the scene, radically transformed an industry or aspect of life, and then plateaued towards a new normal. They have varied in their effect: some innovations made a product dramatically cheaper. Others improved the quality of a good or service. Others came up with a good or service that was entirely new. And some did a combination of all three. This unevenness extends to parts of the economy. Agriculture was completely transformed in the twentieth century. Some service industries, by contrast, have seen less change. No transformative change of the past was foreseeable ahead of time.

Productivity policy is about *positioning* rather than prediction. It involves a set of institutions and policy settings that can foster innovation and can efficiently test, select and spread the best new ideas across the economy. By this, the benefits of (uneven) progress can be widely shared.

Our current state

The unevenness of productivity growth — both in its causes and effects (cost, quality and novelty) — makes it hard to measure. But the evidence suggests that like its global peers, Australia's productivity growth has slowed in the past two decades.

Recapturing the productivity growth rates of the past could yield large benefits in extra income alongside a reduced working week.

But productivity faces some headwinds. One is the gradual but dramatic rise of a predominantly services-based economy. Ironically, productivity growth in the production of goods has seen a shift of labour and other resources into services, which have risen to make up 80% of the economy. Many services are delivered in person. Many are government funded and/or delivered. Often it has proven hard to automate aspects of the service, or otherwise economise on the labour input. Hence productivity growth in most services has been slower than traditional sectors like agriculture, manufacturing and mining, where capital

has replaced much labour and new technology has driven large gains in overall productivity. Moreover, globally, Australia ranks lower in service sector productivity than we do in the goods sector.

Slower productivity growth in services is a historical pattern. It need not be our future. New approaches, such as digital technologies and the better use of data (through artificial intelligence, for example) hold great promise for broadly based productivity gains, including in services.

This does not mean that we will ignore productivity enablers in traditional industries. Rather, the point is to broaden the policy conversation about productivity to encompass the services sectors that now employ the bulk of the workforce.

The COVID-19 pandemic has forced the take up of technology, including online retail, telehealth and remote work. It forced new realities on the producers and consumers of services — the sector hardest hit by pandemic restrictions. The adaptations forced by the pandemic (including of government regulators) are now opening new possibilities for future productivity growth, if we can grasp them.

But the pattern of productivity growth could look different in services. Perhaps quality improvements will be more salient than cost reductions, making it even harder to accurately measure the gains. Service innovation could be focused less on the invention of new technology and more on its use, particularly for a small open economy like Australia. Getting value from university expertise could be as much about person-to-person connections as commercialising academic intellectual property. A focus on service sector productivity forces a rethink and subtle adjustment of many traditional policy tools.

Global forces are creating their own productivity headwinds. The need to decarbonise the economy is one. Decarbonising represents an effort to reduce costs — specifically the cost of carbon emissions not hitherto counted in firm profits or GDP. It will require global and local innovation, strong partnerships between the public and private sector and significant new investment — partly to replace rather than add to the existing capital stock. Australia's success in meeting this challenge efficiently will be a key determinant of our overall productivity performance in coming decades.

Heightened geopolitical tensions and supply chain disruptions also pose a challenge. Global trade and investment have been a great benefit to Australia as a small open economy. Building supply chain resilience (and redundancy) might be attractive to some firms, but will almost certainly increase costs, and prices faced by consumers. Any fragmentation of the multilateral rules-based order could crimp the benefits to Australia from trade and investment flows.

1. Productivity growth and prosperity

Key points

- * **Productivity growth — producing more outputs, with the same or fewer inputs — is the only sustainable driver of increasing living standards over the long term. While economic growth based solely on physical inputs cannot go on forever, human ingenuity is inexhaustible.**
- * **Sustained productivity growth is a relatively recent historical phenomenon. It has ensured that modern life is richer in potentially every sense compared with any time in the past.**
 - Over the past 200 years, productivity growth has lifted hundreds of millions of people out of poverty and has led to a dramatic increase in living standards for the vast majority of the world's population.
 - Technological developments and inventions — including vaccines, antibiotics and statins — have driven huge increases in the quality and length of life over the past century.
- * **The benefits of productivity growth come in the form of:**
 - goods and services that cost less, in terms of number of hours employees need to work to afford them
 - goods and services whose quality improves over time
 - completely new goods and services invented to improve everyday lives.

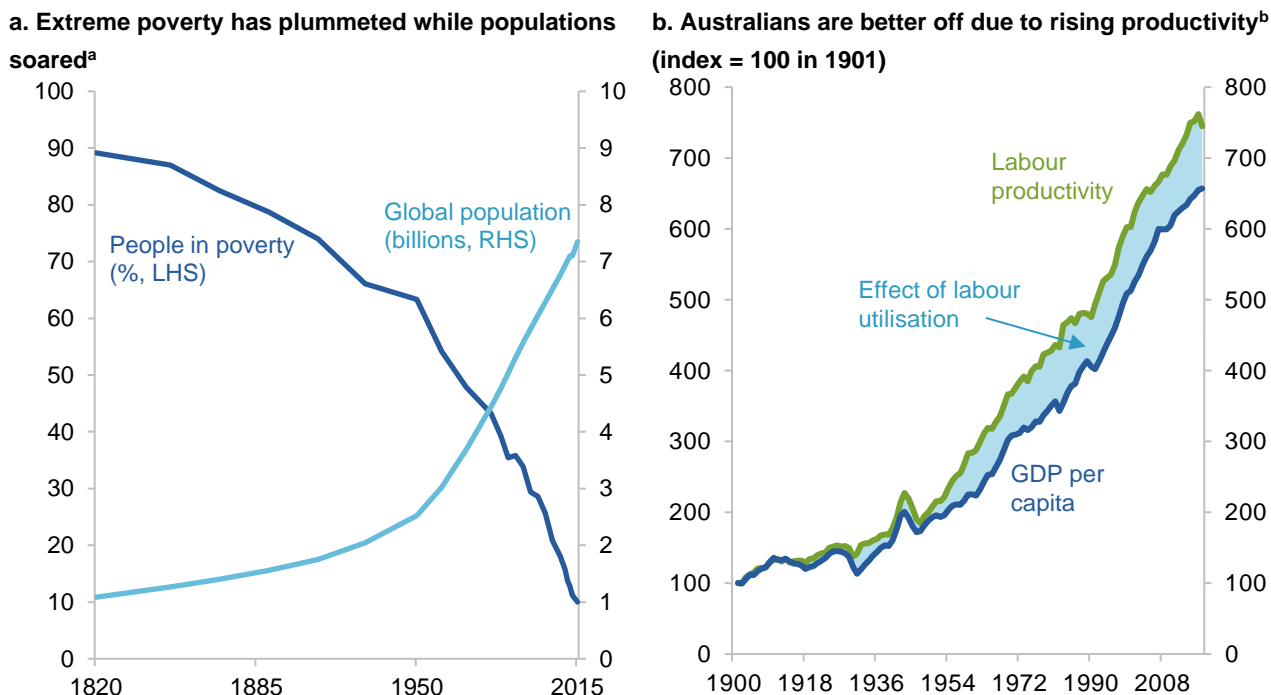
In practice, novel products, improved quality and reduced cost often blend together.
- * **As goods and services become more affordable, people can work fewer hours and consume more; over the past 120 years, the economic output of the average Australian is up 7-fold, while hours worked have consistently fallen.**
- * **While productivity growth is an imperfect measure of rising wellbeing, lifting the rate of productivity growth is an essential element of any policy strategy aimed at increasing the collective welfare of the Australian community. Productivity growth relaxes the constraints of scarcity and opens up opportunities — for individuals, businesses and the general community.**

1.1 Productivity and prosperity go hand in hand

One of the most startling facts in human history is the dramatic rise in living standards over the past two centuries. This is despite the global population increasing almost 7-fold over that period. Just 200 years ago, 90% of the world's population lived in a state of extreme poverty, compared with less than 10% today (figure 1.1 panel a). In Australia, economic output per person — a general measure of prosperity — is about 7 times

higher than at Federation (122 years ago).¹ This transformation is ultimately a function of human ingenuity: of being more productive — working smarter not harder (figure 1.1 panel b).

Figure 1.1 – Productivity makes people better off



a. Extreme poverty is defined as an income lower than 2.15 USD per day (2017 prices, the equivalent of 1 USD in 1985 prices) (World Bank 2022a). **b.** The effect of labour utilisation is the difference in growth between GDP per capita and labour productivity. Here this effect has been negative (decreased growth in GDP per capita) because the ratio of total hours worked in the economy to total population has fallen due to falling average hours worked.

Source: Productivity Commission estimates using Bergeaud, Cette and Lecat (2016); Roser, Ortiz-Ospina and Giattino (2019).

But what has this meant in practice? It means that people alive today have the opportunity to access an array of goods and services that were unimaginable in the past. And access to these goods and services can transform people’s quality of life.

At the turn of the twentieth century, life was materially worse for the average Australian than it is today on many dimensions.

- For every 10 000 newborn babies, more than 1000 died before they reached their first birthday, compared with just 3 in 10 000 today (ABS 2002; AIHW 2022).
- For those that survived childbirth, life expectancy was about 60 years, compared with more than 80 years today. The invention of antibiotics, which largely eradicated infectious diseases such as cholera, diphtheria, pneumonia, typhoid fever, plague, tuberculosis, typhus and syphilis, was decades away, and only became a mainstream medicine from the 1950s (Adedeji 2016).
- During their 60 years of life, the average Australian worked much longer hours than today (the 48-hour week was legislated in 1916); with little access to paid leave (paid annual leave was first introduced into

¹ The picture is similar in other countries. In the United States, 95% of the increase in living standards over the past 70 years is attributable to growth in productivity. In China, 92% of the increase in living standards over the past 30 years was attributable to productivity growth (Feenstra, Inklaar and Timmer 2015).

industry awards in 1935 (Fair Work Ombudsman 2022)); and they worked in a more dangerous workplace (Jansz and Gilbert 2017).

- The average Australian would also die before accessing the age pension, which was introduced in 1909 for men aged 65 years and over (ABS 1988). The average person could afford far fewer goods and services for the wages earned (a steak would have cost the equivalent of 5% of a week's wages (table 1 sources)).
- Home life was more crowded (about 5 people per household in 1910 to less than 3 today in much larger housing (AIFS 2017)) and much dirtier: automatic dishwashers and washing machines did not become commonplace in Australian households until at least the 1970s, and toilets were often located outside the house until as recently as the 1950s.

In many cases productivity growth by itself did not directly cause shorter working weeks, more holidays, and longer, healthier lives — some of the beneficial changes that make life generally better today than in the past. But productivity growth did enable those changes, by consistently freeing up small amounts of time and resources year after year, which could subsequently be reallocated to more valuable pursuits. Small changes add up: steady productivity growth has underpinned massive increases in living standards over the longer run (box 1.1). Although in the short term, people can increase their incomes by working more hours (to increase production now) or consuming less and saving more (to produce more tomorrow), neither option can increase living standards indefinitely.² There are only so many hours in the day to work, and only so much that can be saved from a given income.

Despite its pivotal role in driving prosperity, the precise causes of productivity growth are not universally agreed or well understood (appendix A.2). Some combination of flexible and dynamic markets (where prices determine the allocation of resources), institutional settings (including relatively stable government), transparent property rights, access to resources (including finance), and the application of science and ingenuity to production processes are likely key ingredients. What we are sure about is that productivity growth is about learning to do more with the resources we already have — working smarter, not longer — investing in the latest technology and the best ideas (from domestic and international sources), which become embodied in the things that we build and the ways that we organise and approach tasks.

Productivity growth is generally described in terms of a single, economy-wide aggregate — the percentage change in GDP per hour worked. This measure is invaluable for understanding the rate at which productivity changes, and for making comparisons over time and across different countries. But it can also obscure the reality that underpins the aggregate: the disparate, uneven and unpredictable short-term movements — both up and down over time and at different rates across the economy, reflecting actions taken by individual firms across different industries — that ultimately lead to improvements in the production of individual goods and services.

A more 'micro' lens is a useful starting point for understanding Australia's current productivity challenges and identifying policy responses.

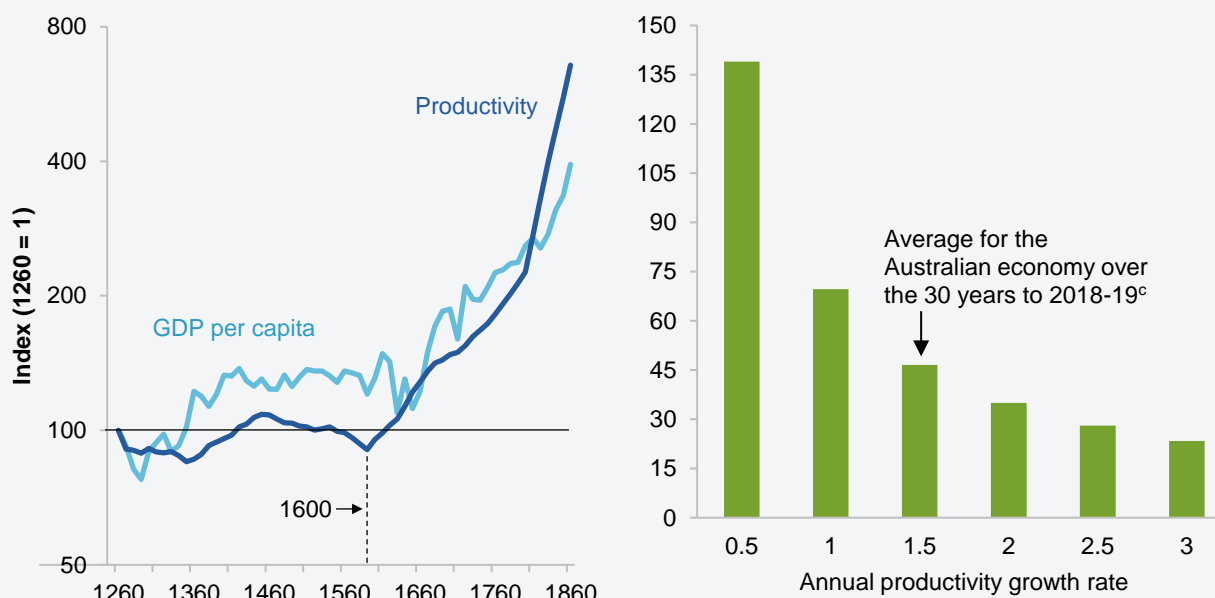
² Technically, both options are, absent productivity growth, subject to diminishing marginal returns on additional capital and labour inputs.

Box 1.1 – Consistent productivity growth is vital for prosperity

The dramatic rise in living standards over the past 200 years is not the historical norm. For most of human history, the average person experienced virtually no growth in material prosperity. This is illustrated for the United Kingdom — one of the only countries where long-term economic data is available — in the figure below (panel a), which illustrates the relationship between GDP per capita and productivity. For many hundreds of years growth in per capita GDP was stagnant, consistent with non-existent productivity growth.¹ Starting in the early 1600s, productivity growth began and rapidly accelerated, as the industrial revolution gathered pace and scope (Bouscasse, Nakamura and Steinsson 2021). Growth in per capita GDP, and increasing economic prosperity, followed.

Compounding of this growth is important: seemingly small productivity growth leads to large changes in economic output over longer periods of time (panel b) — so policy changes that secure even small increases in productivity growth matter. For example, in any economy, if productivity growth averages 2% per year, other things equal, economic output per person will double in 35 years, triple in 55 years and increase by more than 5-fold over 85 years — the life expectancy of an Australian born today. Conversely, if productivity grows at a slower rate of 1% per year, economic output will take 70 years to double.

a. Productivity and GDP per capita in the United Kingdom **b. Years to double per capita economic output^b**



a. Based on estimates of total factor productivity from Bouscasse et al. (2021). **b.** This chart shows for a hypothetical country how long it would take for per capita economic output to double for various rates of productivity growth. It assumes no change in labour utilisation rates (i.e. holding participation and hours worked constant), hence the rate of productivity growth is the sole determinant of the rate of economic growth. **c.** As reported in the 2021 Intergenerational Report (2021a).

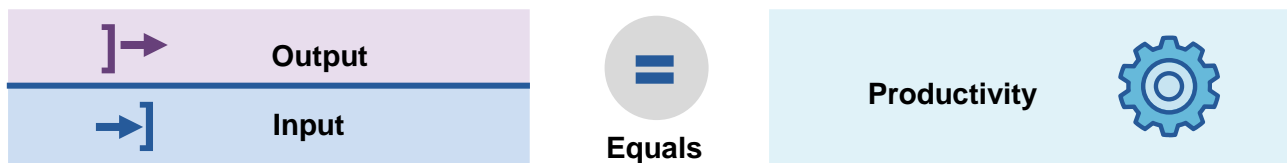
Source: Broadberry et al (2012).

¹ Prior to the 1600s, productivity increases tended to lead to increases in the population and hence there was no change in real living standards. This is known as the Malthusian trap.

**Finding 2.1****Productivity is a recent phenomenon**

Productivity growth is a recent historical phenomenon and over the past 200 years has led to massive growth in living standards around the world.

1.2 A micro lens on productivity growth



At the most elementary level, productivity describes the quantity of products that can be generated (output) from the resources (inputs) used in the production processes.³

In reality, the change in productivity — productivity growth — reflects not only the *quantity* of goods and services produced but also changes in their *quality* over time. It also reflects the invention and introduction of entirely new products.

Hence, the growth in living standards experienced over the past 200 years can be seen as manifesting in three main ways.

1. Goods and services that became **cheaper** — through a fall in the *number of hours* ('labour cost') of workers' time needed to produce existing goods and services
2. Goods and services that got **better** — through improvements in *quality* on multiple dimensions (by an amount worth more than any additional resources required to improve them)
3. **Entirely new** goods and services — as new ways were found to satisfy human wants (or new wants were discovered and developed) either through wholly novel products or new varieties of existing ones.

Different goods and services, and different parts of the economy, have experienced different combinations of these three effects. Some everyday items have become materially cheaper; others have become much better; and many have done both. All the while, the introduction of new goods and services has fundamentally re-shaped the economy.

... growth as we have known it has centrally involved the birth of new products and industries and the decline and death of others, a perspective incompatible with thinking about and measuring growth simply as an aggregate phenomenon. (Nelson et al. 2018, p. 153)

In each of these three ways, productivity growth has increased the typical worker's purchasing power — a smaller number of hours of work is required to achieve any particular level of material living standards (which encompasses the quality, quantity and variety of goods and services).

³ More formally, productivity is defined as the ratio of some measure of output (goods and services after accounting for goods supplied by others) to some measure of inputs (typically labour, machines, equipment, or the combination of these) for some unit of analysis (be it a single company, an industry within an economy, or an entire country).

**Finding 2.2**
The benefits of productivity

Productivity growth benefits the average Australian by increasing their purchasing power. The average worker can consume more, better quality, and novel goods and services, while working fewer hours.

Things that get cheaper: lowering the labour cost of goods and services

Productivity growth often involves finding ways to produce goods and services with fewer inputs. This in turn means that the goods and services become cheaper over time to purchase. One way to measure this is by the number of hours the typical employee (receiving the average wage) needs to work in order to buy particular goods and services. In fact, on this measure, the ‘labour cost’ of many everyday items has indeed fallen consistently over time as productivity has improved (table 1.1).

For example, a double bed with a mattress, a blanket and pillows in Australia in 1901 cost the equivalent of 3 weeks of work at the average weekly wage, compared with 1 week in 1980, and just 2 days in 2021. Even housing rental costs, which have risen in inflation-adjusted terms over the past 40 years, have fallen (on average, across the country) in terms of their labour time cost — the average person needed to work about 20 hours to rent a three-bedroom house in 1901, while in 2021 the same person would only need to work for about 9 hours. A more dramatic example is the bicycle, which in 1901 would require several months of work to afford but now requires less than a day of work.

Table 1.1 – Australians need to work fewer hours to afford most goods and services^{a,b}**Hours of work to pay for goods and services**

Good or service	1901	1990	2000	2010	2019
	Hours	Hours	Hours	Hours	Hours
Double bed, mattress, blanket and pillows	185	41	37	24	18
Bicycle	473	-	14	8	6
Rent	20	12	11	10	9
Theatre (minutes)	321	81	84	69	62
Loaf of bread (minutes)	18	5	6	6	4
Smartphone	-	-	-	60	16
Cars (new, months)	-	17	13	7	5

a. Number of hours required to purchase good calculated by dividing the nominal price of each good/service by the average nominal wage (inclusive of tax, bonuses and superannuation benefits). Nominal prices for all products (except smartphones and cars) is known for 1901 and 2000 and for other years the price was extrapolated using the consumer price index series corresponding most closely with that product. Wages were calculated as labour compensation from the national accounts divided by aggregate hours worked in the economy. For pre-1960 wages, the wage estimates for 1960 were backcasted using a variety of data sources including the Long-term productivity database and Butlin. Nominal prices for smartphones and cars come from 2021 and were extrapolated backwards using the consumer price index. **b.** For figures quoted in months, one month is taken to be 20 work days of 8 hours each.

Source: Productivity Commission estimates using ABS (*Australian System of National Accounts*, 2020-21 financial year, Cat. no. 5204.0, table 1; *Consumer Price Index, Australia*, March 2022, Cat. no. 6401.0, table 7); Bradstock (2021); Birot (2021); Butlin, Dixon and Lloyd (2015); Feenstra, Inklaar and Timmer (2015).

Even from this small sample, it is notable that different goods and services have fallen in cost by varying amounts. The path of real cost reduction is neither smooth nor consistent, as might be implied by looking only at aggregate percentage changes in labour productivity across the economy.

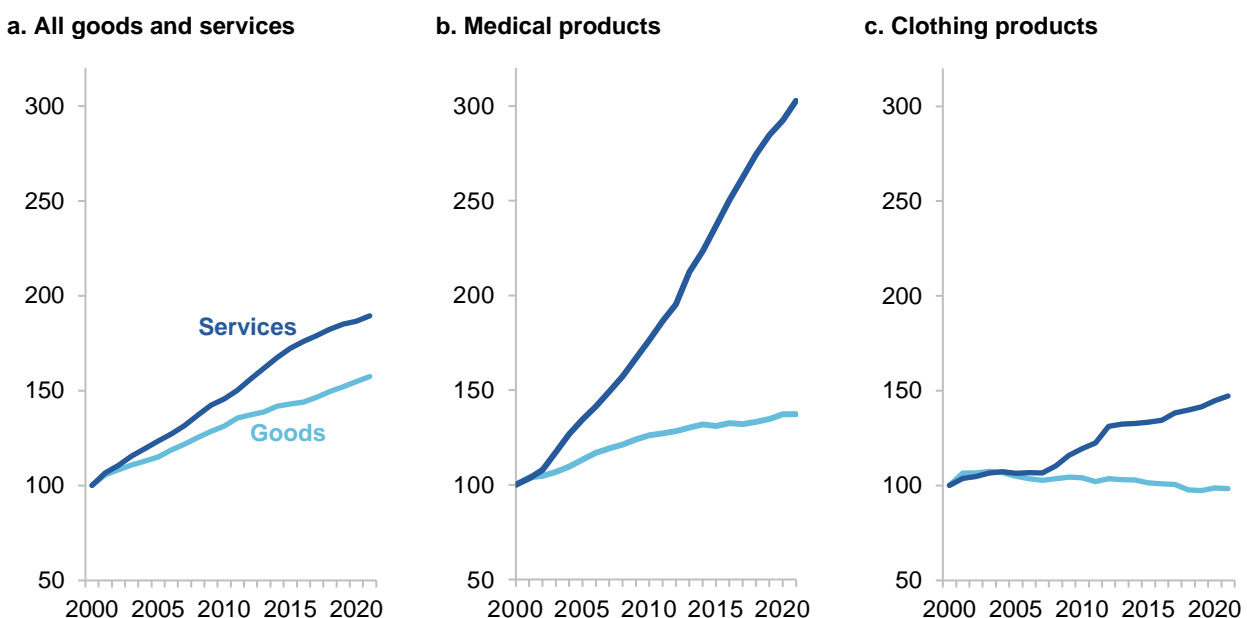
The loaf of bread became cheaper in part because of the complementary effects of innovation and capital investments in agriculture. Innovations — such as the development of synthetic fertilisers, pesticides and new strains of wheat — improved crop yields. These went hand-in-hand with complementary investments in more and better capital that allowed machinery (such as tractors and harvesters) to replace manual and animal labour.⁴

The bicycle became cheaper through improved manufacturing efficiency — cheaper energy, better materials and mass production. The rise of global trade also made the bicycle cheaper to Australian consumers by allowing access to products that are more efficiently produced overseas. In contrast, the cost of housing — measured by rent — has seen a much less spectacular fall, because it has proven more difficult to adopt technological innovations (as well as institutional and governance innovations) which would reduce the real cost of housing, including by getting the most out of available land.

Whether a product is a good or a service can influence how much cost reduction occurs. This can be illustrated by considering pairs of products — one a good and the other a service — that are used in similar contexts (figure 1.2). Almost without exception, the prices of the good, from medical equipment to clothing have risen more slowly (or declined) relative to the price of the similar service (this phenomenon is related to ‘cost disease’ which will be discussed further in chapter 2).

Figure 1.2 – Price growth in services has outstripped goods

CPI index for various pairs of related services and goods (2000 = 100)



Source: ABS (*Consumer Price Index, Australia*, December 2021; Cat. No. 6401.0.; tables 7-8).

⁴ Mechanically interpreting contributions to productivity growth in terms of innovation (or multifactor productivity, MFP) on the one hand — versus capital investment on the other — can potentially be misleading. This is because improvements in MFP raise the productivity (and profitability) of capital, which in turn encourages further investment in capital such that the capital to labour ratio increases. In addition, investment in new capital typically embodies the latest innovation. See appendix A.1 for a more detailed discussion.

Countries with higher productivity typically have a lower cost of living

A similar pattern can be observed across countries. Compared with people in countries that have lower aggregate productivity, the average Australian works fewer hours to purchase the same goods, and vice versa (table 1.2). For example, in Mexico, where labour productivity is 66% lower than in Australia, the average worker would need to work about 4 times as long (420% longer) to afford food, compared with an Australian earning the average wage. Indeed, among the items listed in table 1.2, not a single one is more affordable for the average Mexican (in terms of hours worked) compared with the average Australian.

There are exceptions to this general finding. Compared with the United States, where labour productivity is about 20% higher than in Australia, some goods and services, such as pharmaceuticals and medical services are *more expensive* (90% and 19% respectively) in terms of average hours worked. These outcomes can often be a function of specific government policy designed to alter the consumer prices of certain goods and services. For example, Australia's Pharmaceuticals Benefit Scheme subsidises the cost of selected drugs making them cheaper for consumers.

Table 1.2 – Relative labour cost of goods and services in different countries^a

Labour costs relative to Australia (percentage difference) by country in 2017

Good/service	Mexico	New Zealand	United States
Food (all)	419	42	-17
Bread	425	6	-30
Clothing and footwear	511	29	6
Actual rents for housing	173	21	-29
Electricity, gas and other fuels	224	29	-38
Pharmaceutical products	1331	90	90
Medical Services	178	-11	19
Motor cars	662	62	15
Education	1	-21	37
Catering services	319	17	-16

a. Labour cost is the price of a good/service divided by the average wage (average annual employee earnings divided by average annual hours worked per employee). That is, the number of hours required to buy that particular good or service.





Source: Productivity Commission estimates using OECD (2022b) and unpublished data from the World Bank International Comparisons program (2017 release).

Things that get better: improving the quality of goods and services

Many of the benefits accruing from productivity growth come in the form of improved quality of existing products (figure 1.3). Postal services are faster today, as are almost all communication mediums, including mobile phone networks and the internet, and the quality of the services (e.g. in terms of network reliability) is much higher. Entertainment, such as music and television, is available on a wide variety of mediums, making it more accessible to more people. And health services are available to treat a wider variety of ailments and illnesses with much higher diagnostic precision (more on this below). Goods, such as cars (safer, more powerful, more fuel efficient, more automated); computers (faster and smaller); and homes are all now built with better quality materials with greater functionality and more features than they had in the past.

Each of the quality factors discussed above are ultimately reflected in the prices of each product. But because the price of a product is not typically broken down to reveal the contribution of quality and other changes in attributes, this makes it difficult to directly assess the benefits of productivity growth. The benefits of productivity growth for improved quality can, however, be determined by comparing the quality-adjusted and non-adjusted change in the price of a product over time.

Figure 1.3 – Then and now

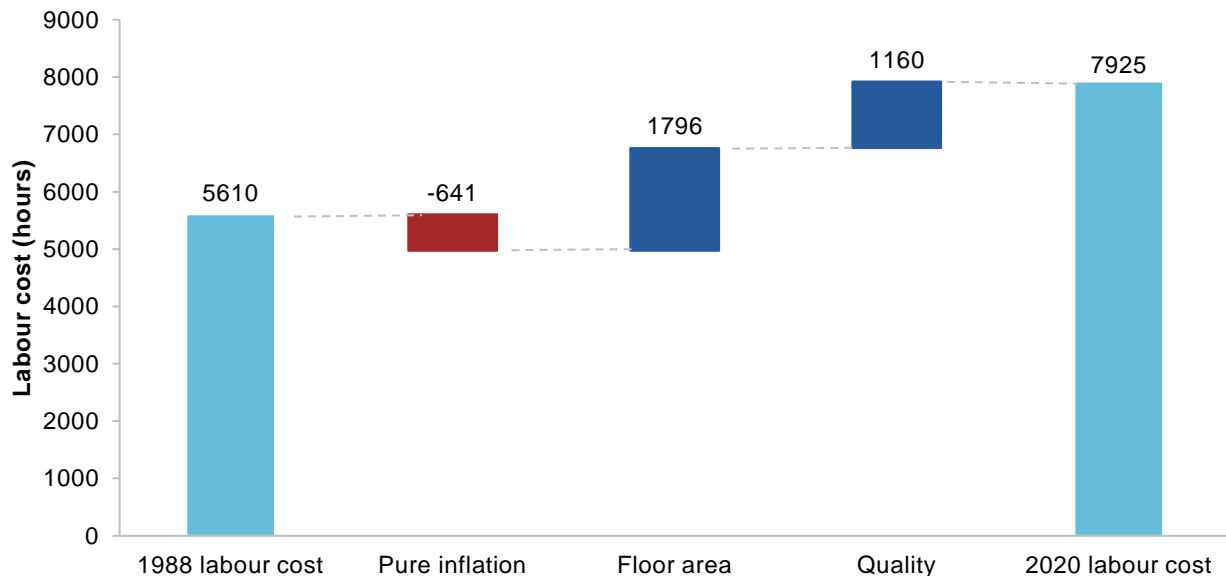
Ford Model T (1908)	VS	Tesla Model 3 (2022)
 <p>20hp crank started Internal combustion</p> <p>~70km/h</p> <p>34-64 km</p> <p>no seat belts</p> <p>Paper maps</p> <p>Sprung Leather seats stuffed with horsehair and cotton</p>	<p>Engine</p> <p>Top speed</p> <p>Range</p> <p>Safety</p> <p>Navigation</p> <p>Comfort</p>	 <p>283hp electric</p> <p>>250km/h</p> <p>600km</p> <p>seat belts, air bags, automatic braking and computer aided collision avoidance systems</p> <p>GPS navigation on an internal touch screen</p> <p>Heated seats and steering wheel and 13 speaker audio system</p>
Apple PowerBook 100 (1991)	VS	Apple MacBook Air (2022)
 <p>9 inch monochrome (1 colour) 640 x 400 pixels</p> <p>Lead acid battery with <4 hours</p> <p>2.3kg</p> <p>up to 40 megabytes</p> <p>Plastic</p> <p>serial modem</p> <p>Single speaker</p>	<p>Screen</p> <p>Battery</p> <p>Weight</p> <p>Storage</p> <p>Material</p> <p>Communication</p> <p>Sound</p>	 <p>13.3 inch touch screen, millions of colours, 2560 x 1600 pixels</p> <p>Lithium polymer up to 18 hours</p> <p>1.3kg</p> <p>1TB (25,000 times larger)</p> <p>Aluminium</p> <p>WiFi, Bluetooth and built in high definition camera</p> <p>Stereo speakers & headphone jack</p>

Source: Information on Apple Powerbook 100 and Macbook Air: Apple (2022) and Wikipedia (2022); Information on Ford Model T and Tesla: anon (2017), Alvarez (2007) and Tesla (2022).

The cost of constructing a house (excluding the land) is illustrative (figure 1.4). Between 1988 and 2020, the labour cost of constructing a new house increased from 5610 hours of work for the average worker to 7925 hours. That is, housing became more expensive. But this was entirely driven by the increasing size (floor area, 1796 hours) and quality (1160 hours) of the average detached house. In fact, the labour cost of building a house in 2020 of identical size and quality to a 1988 house actually fell by 641 hours — or about

11%. Put differently, the typical worker in 2020 wanting to construct a house of the same size and quality typical in 1988 would find it more affordable (641 fewer hours of work time). And most houses now cost more than they did in 1988 because modern detached houses are typically larger and of higher quality.

Figure 1.4 – Houses are costlier to build today because they are bigger and better^a
Price, size and quality contributions to the labour cost of constructing a new house in 1988 compared with 2020



a. The quality effect is the difference in the growth of the average cost of constructing a new house and the implicit price deflator used by the ABS to derive chain volume estimates of construction activity.

Source: Productivity Commission estimates using ABS (*Building Activity, Australia*, various releases, Cat. no. 8752.0.); Feenstra, Inklaar and Timmer (2015).

Entirely new things: increasing the variety of goods and services

Productivity improvements also come in the form of novel products, which contribute to an increase in product variety. A notable example is the introduction of electric sources of light. When this service was first introduced, the market price of electric lighting was similar to gas. But the light produced was brighter, creating substantial additional benefits (e.g. fewer accidents in factories) without requiring additional resources.

A more recent example is the rapid improvement in communication technology: between 1983, when mobile phones were first introduced, to 2007, when the first ‘smartphone’ (the iPhone) was introduced, mobile phones evolved from being brick-like devices that could be used for making wireless phone calls (itself a significant breakthrough), to small hand held computers with complete access to the internet, bundling a broad range of functions including telephony and photography.

Smartphones are now ubiquitous around the world — there are more people with a smartphone than with a flushing toilet.⁵ This ubiquity tends to understate the immense economic value of the novelty (including its mobility and versatility) of the smartphone. It has been estimated that to create the equivalent computing

⁵ In 2018, about 67% of the global population (5.095 billion out of 7.602 billion) own a smartphone while in 2018 about 60% of global population did not have a toilet to safely manage human waste at home (Statistica 2022; UNICEF 2018; World Bank 2022b).

power contained in an iPhone X in 1957 (using vacuum tubes) would have cost roughly one and a half times 2017's global GDP (or 14 times the global GDP in 1957), required 100 billion square metres of floor space (a factory 50% larger than Tasmania) and consumed about 30 times the global electricity generation capacity at the time (DeLong 2017).

The smartphone showcases how novel products, improved quality and reduced cost often occur simultaneously. In addition to the novelty of the smartphone, it also indirectly reduces cost by replacing a range of other items for many people: cameras, torches, stereos, telephone books and calculators.

Overall, the volume of new and improved goods (and increases in their variety) introduced into the market each year is enormous. For example, more than 50% of online transactions between 2014 and 2017 were purchases of products that did not exist in the previous year (Goolsbee and Klenow 2018).

The benefits of new and better products are larger than we might think

The size and nature of the benefits of novel and improved quality products are difficult to measure and are typically underestimated (box 1.2 and appendix A.3 and A.4). Whilst these measurement problems have always been present, it is unclear whether they have worsened or improved in recent decades and hence it is also unclear whether the consumer welfare gain associated with recent innovations (often involving ICT products and the internet) has been larger or smaller than other past breakthroughs (such as electricity or refrigerators) (Gordon 2018; Mokyr 2018).

Box 1.2 – Examples of mismeasuring the benefits of new products: statins and free digital goods

To measure the benefit of new products accurately, we would need to know how much people would have hypothetically paid for the new product before it existed. Similarly, for products whose quality (or variety) has improved, we would need to know how much a consumer would have been willing to pay for the quality improvement, or for greater variety of choice.

These measurement issues can be illustrated with reference to the productivity benefits associated with the ICT revolution such as smartphones, discussed above, and 'free online goods and services' such as social media and map apps. The benefits of free goods and services are likely undermeasured because while they create significant value for consumers, there is no price with which to weight them and the advertising revenue they generate likely also understates their value. Brynjolfsson et al. (2019) recently developed a method to estimate the value created by these services and found that the existence of Facebook alone would, if properly incorporated into GDP measurement, add about 0.05-0.11 percentage points to annual GDP growth. Including the gains to consumer welfare from cameras on smartphones adds another 0.62 percentage points to annual growth in GDP (between 2008 and 2017). Even if these estimates are optimistic, they do point to the real consumer benefits that have accrued from the ICT revolution that are often undermeasured in productivity statistics.

Medical improvements over the past century provide some notable examples of novel products that have provided large benefits to society (Feldstein 2017). One contemporary instance is statins (others are vaccines and antibiotics), which were trialled in 1994 as a cholesterol reducing medication, and are today the most prescribed medication among Australians aged 65 and over to treat cardiovascular disease (in 2016 44% of this age group were prescribed statins (Ofori-Asenso et al. 2018)). The benefits of statin use to

individuals and society are large. They accrue in the form of, for example, additional years of life and earnings by lowering morbidity rates, heart attacks, strokes and related hospitalisations.

More generally, mismeasurement of the benefits of novel and improved quality products may mean that real wages growth has actually been higher than its measured rate.

Advantages of the micro lens

Seeing productivity growth through a micro lens — as existing goods and services that get cheaper and better through time and new products that come into being — has several advantages.

First, a micro lens demonstrates that productivity growth *manifests* differently in different parts of the economy. Some goods and services (including many manufactured products) have become dramatically cheaper over time (such as through productivity improvements in their source country). Others (such as health care) have primarily improved in quality rather than cost. Other goods and services have not improved as much along either dimension.

Second (and relatedly), a micro lens reminds us that the *proximate causes* of productivity growth, such as specific innovations and technological discoveries, operate in uneven and unpredictable ways — both across the economy and through time. There are observed waves of technological progress in enabling areas such as energy, transport or communications, with rapid take-up often followed by a levelling off at high rates of adoption. Some innovations have broad application (so-called ‘general purpose technologies’), such as the take up of electricity, computers or the internet; others have more specific application to an individual industry. The implications for rates of productivity growth across and within different sectors of the economy vary considerably.

Third, a micro lens demonstrates that the benefit of productivity growth is not merely about having more ‘stuff’ — that is, cheaper and more plentiful supplies of the existing suite of goods and services. Much of the dividend from productivity growth comes in the form of better or entirely new goods and services, often satisfying new or previously unaddressed human needs.

Fourth, a micro lens illustrates that the analysis of productivity growth need not be confined to that which is measurable or included in an aggregate such as GDP. Productivity growth can improve lives on multiple dimensions wherever innovation can reduce the inputs required to achieve a desired outcome. The right policies and institutions can encourage productivity growth in non-market sectors (where it may not be reflected in GDP statistics), for example.

Nonetheless, there are important insights to be gained from taking all these disparate instances of productivity growth and combining them into a statistical aggregate, such as GDP per hour worked. For all their imperfections, these aggregate measures do tell us something about relative progress through time and across countries.

1.3 The aggregate picture

Despite the uneven *sources* of productivity growth, the benefits tend to be widely distributed across the economy in the long term, flowing to business owners, workers and ultimately, consumers.

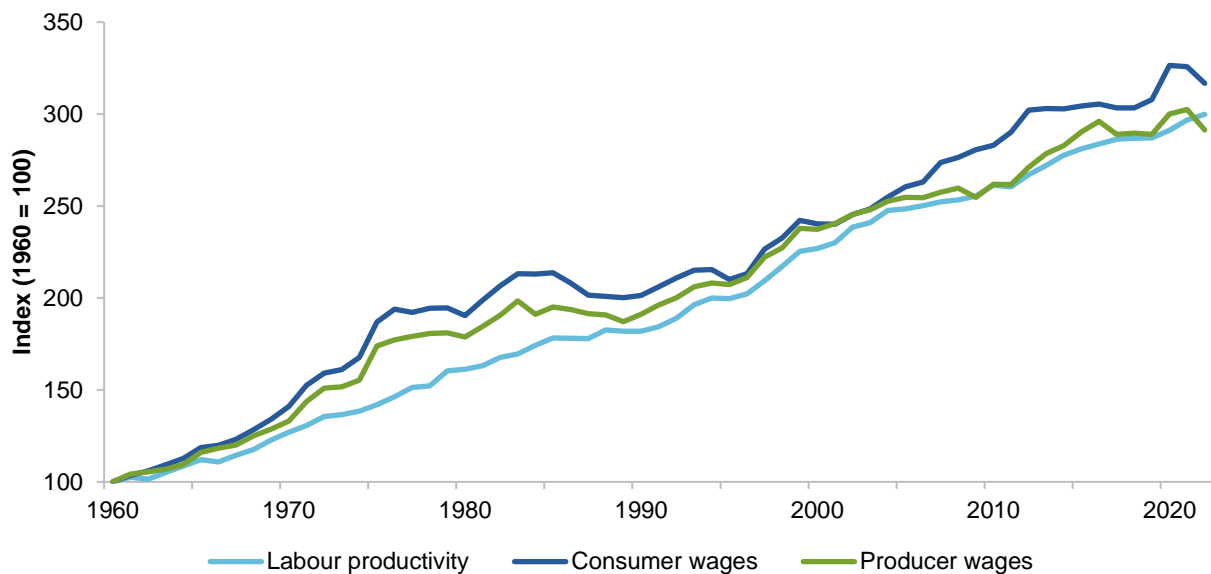
Being more productive enables increases in real wages

In terms of wages, growth in labour productivity — the broadest measure of productivity, which measures the number of hours required to produce a unit of economic output (GDP) — is very strongly correlated with the long-term growth in real wages received by the average worker (figure 1.5). In the short to medium term, factors such as relative bargaining power and economic shocks, such as large movements in the terms of trade, can lead to deviations in the relationship between real wages and productivity — for example, in the

1970s when growth in wages outstripped labour productivity (leading to an expansion in the labour income share) and conversely over the past decade when the opposite occurred (box 1.3). But in the long run, almost all increases in real wages are due to labour productivity improvements.

Figure 1.5 – In the long run, wage increases are driven almost entirely by productivity growth^{a,b,c}

Australian average hourly real wages and labour productivity, 1959-60 to 2021-22 (indices, 1960 = 100)



a. Due to data limitations, the wage data are constructed using total labour compensation per hour only, without labour income from owner operators, which was not available back to 1960. Hours data (used to calculate both labour productivity and wages) prior to 1975 have been sourced from the Penn World Tables. **b.** Consumer wages are calculated by deflating nominal average hourly wages by the consumer price index, producer wages are calculated by deflating nominal average hourly wages by the GDP deflator, while labour productivity is calculated by deflating nominal GDP per hour by the GDP deflator. **c.** Total hours (which includes employees *and* owner operators) are used to calculate average wages, not just employee hours. Even if estimates for employee hours were available back to 1960, it is necessary to use total hours in both the wage and labour productivity calculations for the purposes of, for example, analysing changes in income shares (these issues will be explored in a forthcoming PC research paper). It should be noted, however, that constructing real wage measures that include labour income from owner operators using the more detailed data available for the period after 1995 shows almost identical movements to the data series shown in this chart.

Source: Productivity Commission estimates using ABS (*Australian System of National Accounts*, 2020-21 financial year, Cat. No. 5204.0, tables 1,16, 46; *Consumer Price Index, Australia*, December 2021, table 1, Cat. No. 6401.0); Feenstra, Inklaar and Timmer (2015).

Box 1.3 – Why might the rate of real wages growth diverge from productivity growth?

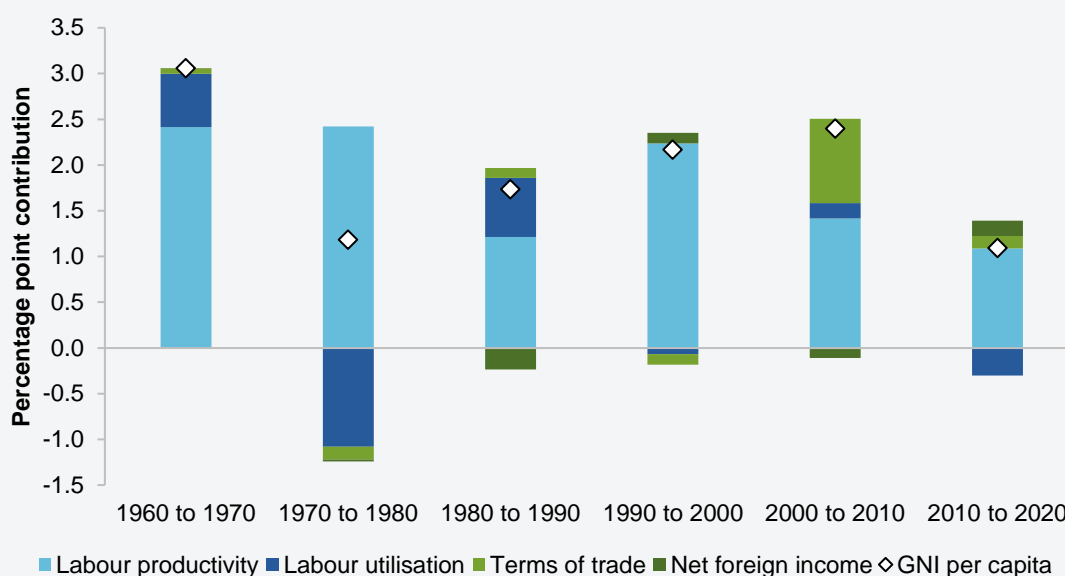
Over the *long run*, real wages are almost entirely driven by productivity. However, over the short and medium term, changes in, for example, the terms of trade and utilisation rates in the labour force, can temporarily cause a divergence between wages and productivity growth (figure).

With respect to the terms of trade, when global demand is particularly strong for Australian commodities, our export prices — and our terms of trade — tend to rise. A rising terms of trade generally causes measures of real income to rise with them. Indeed, in the most recent mining investment boom (roughly 2001-02 to 2011-12), real wages in Australia increased at about twice the rate of growth of labour productivity and gross national income (GNI) per capita increased almost three times as much as labour productivity.

Changes in labour utilisation (which measures the effect of labour force participation, unemployment and average working hours) have also contributed to increases in real incomes during certain periods. Structural changes in the Australian economy beginning in the 1960s led to rising labour force utilisation as the share of women (and later, also the average number of hours they worked) in the labour force increased. On average, this contributed about 0.5 percentage points to annual growth in GNI per capita over the decade. However, across the past 60 years, increasing labour utilisation has contributed less than 0.1 percentage points to annual growth in the same measure (figure).

However, in the long run, the magnitude of the income effects pales in comparison to the much larger effect of sustained productivity growth. For example, even if the gains to national income from the terms of trade since 2000 (which added about 23% to gross national incomes) are sustained permanently, this contribution would still be outweighed by the 33% increase to incomes accruing from labour productivity growth over the same period.

Terms of trade booms and increasing participation drive only temporary changes to real growth in average national incomes^{a,b}



a. Real wages are defined as labour compensation per hour (using Penn World Tables for hours pre-1980) but excludes the income of the self-employed. b. Real wages have been deflated by CPI while GNI per capita and labour productivity were deflated by the implicit GDP deflator.

What determines who — business owners, workers or consumers — receives the benefits from productivity growth over time is complex, particularly in a modern economy where the distinction between these groups can be somewhat artificial (e.g. a worker can be an employer and a shareholder in a business, as well as a consumer). With respect to wages, at least in the near term, factors such as the relative bargaining power between business owners and employees, and the institutional and regulatory settings that govern these interactions, are important.

The extent to which the gains from productivity growth are passed on to consumers (through lower prices) is a function of market structures, both in input and output markets. This includes the extent of barriers to market entry and the degree of competition, which determines the markup that businesses can charge for their products. Again, the distribution of gains can also be affected by institutional settings — such as legislation affecting how businesses compete (competition policy) and how much of the profits from innovation they can capture (this includes intellectual property rights legislation, and subsidies or taxes designed to alter relative prices, and therefore consumption).



Finding 2.3 **Productivity necessary for long run wage increases**

Almost all sustained increases in real wages are underpinned by improvements in labour productivity growth.

Being more productive enables greater consumption

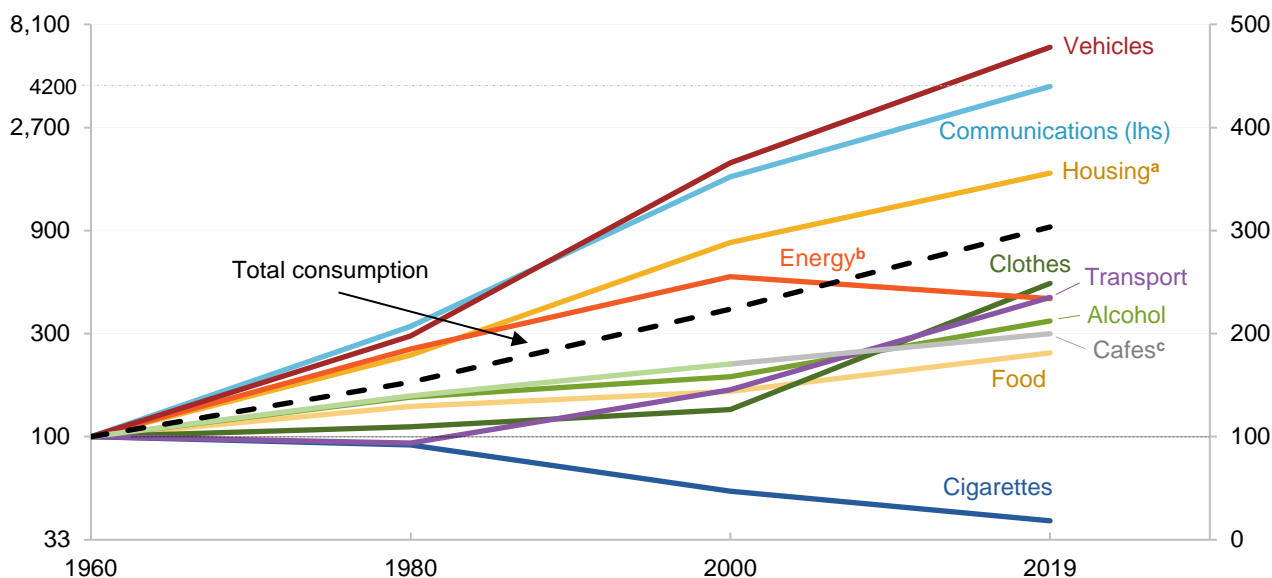
A consequence of productivity growth lowering the labour cost of most goods and services is the potential for higher consumption of almost everything. The average Australian now consumes about 3 times more than they did in 1960, across almost every category of goods and services (figure 1.6).

Much of these increases in consumption have come through *quality* improvements rather than *quantity*.⁶ As illustrated above for cars and laptop computers, typically consumer products have significantly improved in quality and variety. These quality improvements — because they provide substantial benefits to consumers — are measured as higher levels of consumption, even where the physical number of products consumed is the same.

But again, there are exceptions to this finding, which can be the outcome from government policy. For example, the falls per person in consumption of cigarettes likely reflect attempts at both moral suasion (e.g. negative advertising campaigns) and the use of ‘sin taxes’ (which, by pushing up consumer prices of cigarettes, puts downward pressure on their consumption) by governments seeking to reduce the incidence of smoking.

⁶ The net change in consumption is the result of changes in three factors: the quantity of a product consumed, changes in the mix of products consumed (buying more high value products) and changes in the quality of products consumed.

Figure 1.6 – Australian household consumption has increased for almost everything
Real household consumption per person (1960 = 100, right hand axis unless noted)



a. Housing consists of actual rents and imputed rents for owner occupiers and maintenance of dwellings. b. Includes electricity, gas and other fuel. c. Includes hotels and restaurants.

Source: Productivity Commission estimates using ABS (2021, *Australian System of National Accounts*, 2020-21 financial year, Cat. no. 5204.0, tables 1 and 42).



Finding 2.4
Productivity is also about quality and novelty

Being more productive means that the average Australian can consume more higher quality and completely new goods and services.

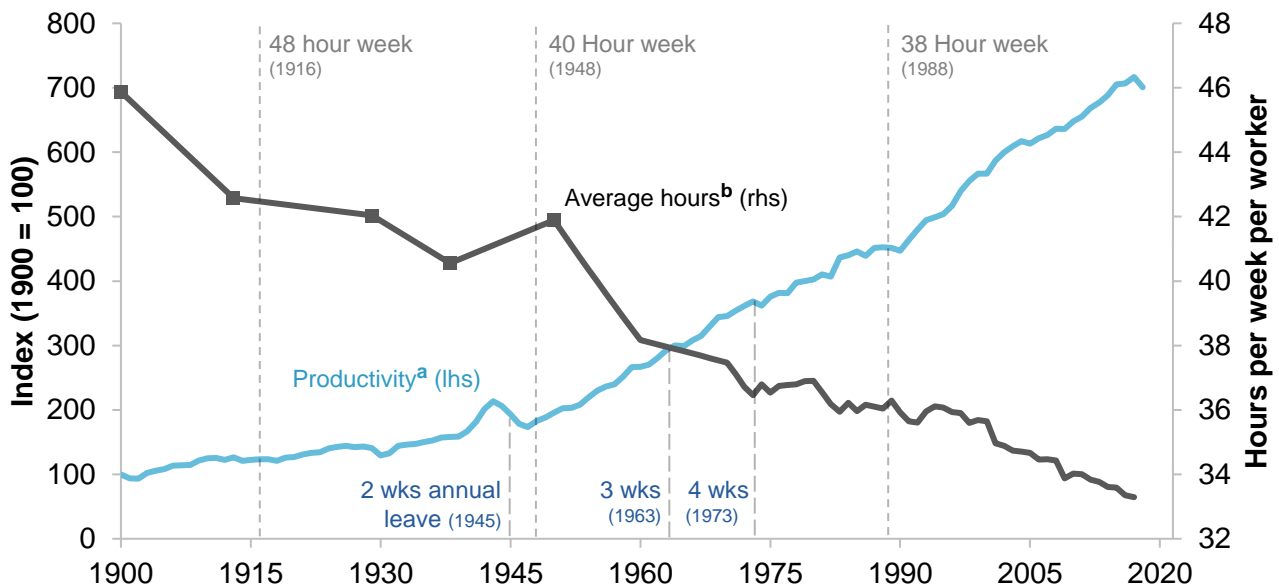
Being more productive enables more leisure

Productivity growth can also enable Australians to reduce their hours spent working (at least in a paid capacity). And most importantly — because of increased purchasing power (the amount of goods and services that can be purchased from income earned) — Australians can actually work fewer hours and still be at least as well off in terms of how much they can consume. While not all reductions in hours are due to productivity growth (the tax system also affects hours worked, for example), it enables people to work less and consume more (box 1.4). This has been the lived experience of the average Australian (and much of the world) over the past 120 years (figure 1.7).

Since 1900, aggregate labour productivity has increased by more than 700%, underpinning a similarly large increase in economic output per person (650% between 1901 and 2018, figure 1.1 panel b) and facilitating a

significant reduction in average hours in paid work, which fell by about 30% or 13 hours in line with legislated reductions in the length of the working week and annual leave provisions (figure 1.7).⁷

Figure 1.7 – Productivity growth supports higher economic output with less work



a. GDP per capita is expressed in \$US2011. b. Prior to 1950 the data is reported on an intermittent basis and shows full time hours for production workers only. From 1950 the data is reported annually, for all workers.

Source: Bergeaud, Cette and Lecat (2017); Denniss (2003); Irvine (2021); National Museum of Australia (2022); Roser, Ortiz-Ospina and Giattino (2020).



Finding 2.5 Productivity enables leisure

Being more productive means that the average Australian can spend fewer hours at work to achieve a given level of consumption if they choose to.

Box 1.4 – Productivity growth makes it possible to consume more and work less

The decreased hours of work and increased income that result from productivity growth can be thought of as a ‘productivity dividend’. One way to illustrate these benefits of productivity growth is to think about the trade-off that it implies for the average worker between hours spent working on the one hand, and consumption possibilities, on the other. As discussed, productivity growth leads to higher real wages and lower real prices, which means that the average worker can choose to:

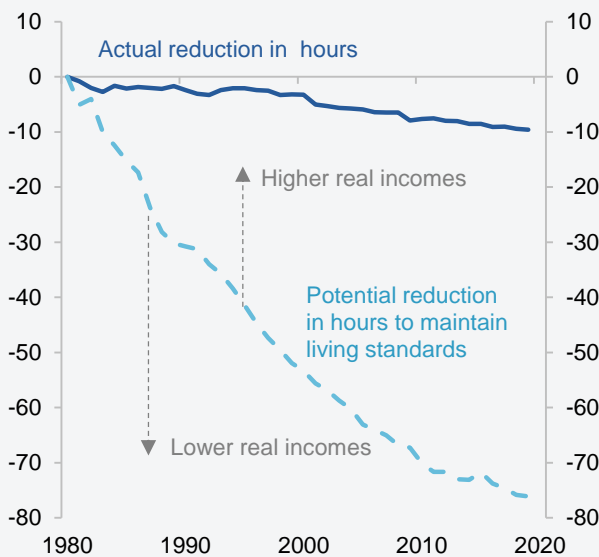
⁷ More recently average working hours have fallen due to a combination of increases in part-time work — primarily women entering paid work on part time hours — and a decrease in full-time work — principally men who were working full-time leaving the labour force (Lattimore 2007, ABS 2022c). However, overall, the average working hours per employee of both genders has fallen over the period 1978 to 2022, although the fall is more pronounced for male workers (ABS 2022c).

Box 1.4 – Productivity growth makes it possible to consume more and work less

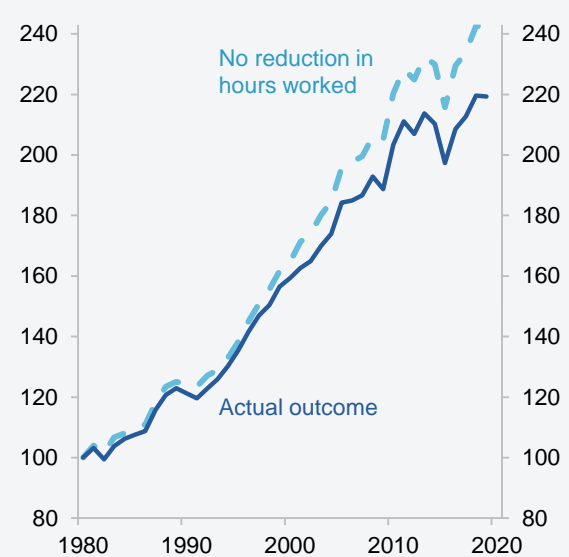
1. work the same and consume more (the whole dividend is used to increase consumption)
2. work less and consume the same (the whole dividend is used to reduce work)
3. some combination of the above including working *less* and consuming *more* (the dividend is divided between less work and more consumption).

In practice, Australians have (looking collectively) implicitly ‘chosen’ the third option. The outcome of this choice, in terms of work and income, is illustrated in the figures below. The solid line in panel a shows that since 1980, Australians have used their productivity dividend to reduce their average hours worked by about 10%. Over the same period, real incomes (as proxied by growth in real GDP per capita) more than doubled (solid line in panel b). The dashed line in panel a illustrates option 2. If Australians had been content with a 1980s standard of living they could have reduced their average hours by 76% (28 hours per week) and real incomes would have stayed the same. In other words, Australians used about 13% of the productivity dividend to ‘purchase’ leisure. The dashed line in panel b illustrates option 1 and shows that if there had been no reduction in hours worked (assuming that actual labour productivity outcomes prevailed) incomes would have increased by an additional 22 percentage points since 1980.

a. Actual vs potential change in hours worked per week to maintain GDP per capita at 1980^a



b. Actual vs potential income (GDP per capita) growth since 1980^a (index 1980=100)



a. GDP measured at chained PPPs in million 2017US\$ using data from 2019.

Source: Productivity Commission estimates using the Penn World Tables (eleventh edition).

1.4 Productivity: what lies beyond the aggregates?

Aggregate measures of productivity growth provide a useful approximation of the rate of economic progress, including the trade-off between consumption and work. But the micro lens illustrates the richness and variety in the way economic progress unfolds in the real world. And there are other aspects of community wellbeing that the macro aggregates can miss (although in many cases these tend to be positively correlated with productivity growth).

In practice, community wellbeing can be imperfectly represented by aggregate measures such as income per capita or GDP per hour worked. Three commonly cited areas in which these economic aggregates fall short are:

- **equity:** are the fruits of rising productivity being evenly shared across all groups and individuals?
- **the natural environment:** are we adequately counting the impact of environmental degradation, carbon emissions or the depletion of natural resources?
- **life satisfaction:** do higher incomes necessarily make us happier?

How well does Australia spread the gains of productivity growth?

Historically, consumers have received outsized benefits from productivity growth. For example, analysis of the US market (Nordhaus 2004) showed that about 98% of the value generated by the production of novel goods and services between 1948 and 2001 accrued to consumers, as opposed to entrepreneurs and business owners.⁸

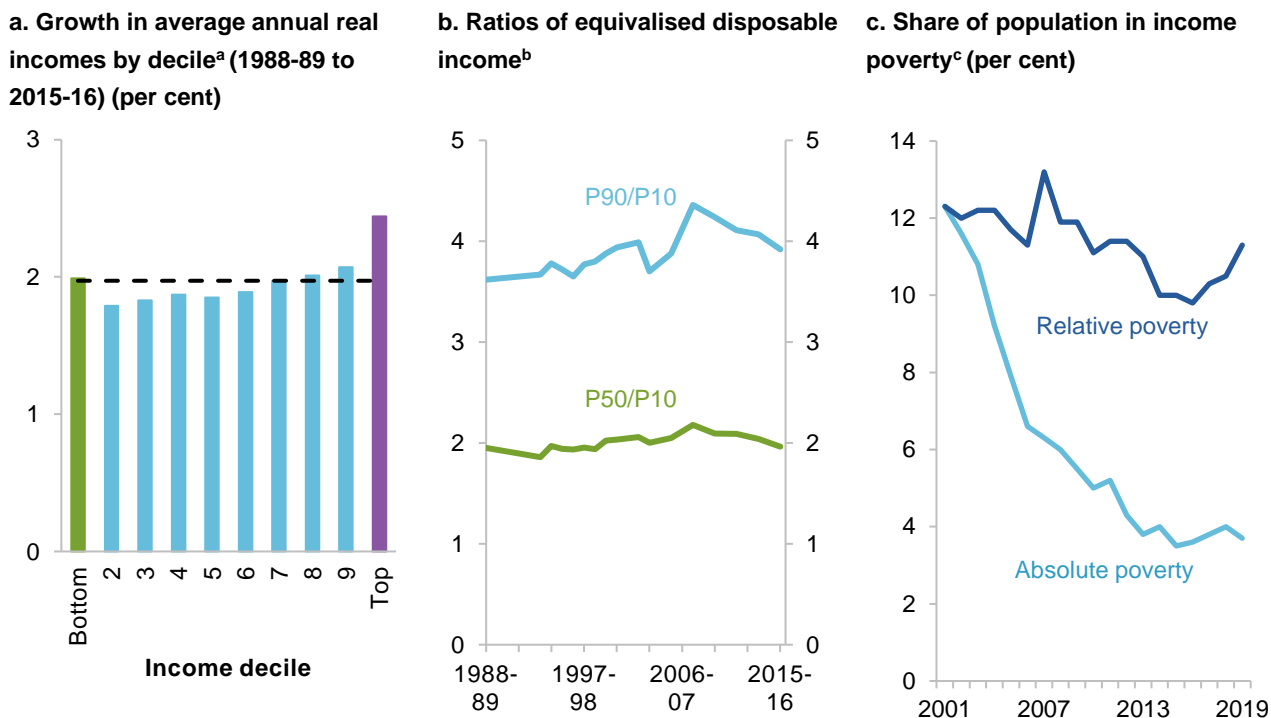
In many other respects, the fruits of productivity growth (such as quality improvements and lower prices) inherently benefit everyone regardless of income (as discussed, technological advances tend to become embedded in new and existing goods and services, improvements in medical services — which benefit all Australians in the form of subsidised access to medical care — is one such example).⁹ That said, a focus on average outcomes can mask the actual lived experience of some Australians. In this case, redistributive policies, including provision of a robust safety net, play a role in ensuring that the benefits of productivity growth are widely distributed. And productivity growth, by growing the pie, allows governments, via the tax and transfer system, to reinforce that safety net (box 1.5). Indeed, over the longer term, providing a more generous social safety net and delivering the government services that many Australians rely upon would not be possible without robust productivity growth.

Over the past three decades, real income growth of the lowest income groups has been only slightly below the average (figure 1.8 panel a). Inequality in income (and consumption) has increased only modestly in Australia since the late-1980s and measures of income poverty have tended to fall, significantly so in the case of absolute poverty over the past two decades (figure 1.8 panel b and c).

⁸ Nordhaus (2004) estimated the social value of technological advances and the amount that was captured by producers and consumers. The typical rate of return on capital in the United States between 1948 and 2001 was about 5.9%, which is very close to the cost of capital (Nordhaus 2004, p. 35), indicating that most firms typically do not capture profits above the cost of capital.

⁹ In absolute terms, even if the *nominal* income of Australians does not change, real incomes will likely rise due to lower prices, higher quality and the invention of new products — in this way the benefits are broadly distributed. In a relative sense, low income Australians may have benefited by proportionately more than the average to the extent that they spend a higher share of their incomes on non-discretionary items, such as food, whose price has fallen dramatically in line with agricultural productivity improvements, amongst other things.

Figure 1.8 – Productivity growth has not exacerbated inequality and, it has been associated with rapidly declining absolute poverty rates



a. Income is deflated by CPI. b. Equivalised measures of income adjust for household size and composition. c. Relative poverty is defined as household equivalised income that is less than 50% of the median household equivalised income. Absolute poverty is based on an income poverty threshold whose real value is held constant over time. In this case, equivalent to the relative poverty threshold in 2001.

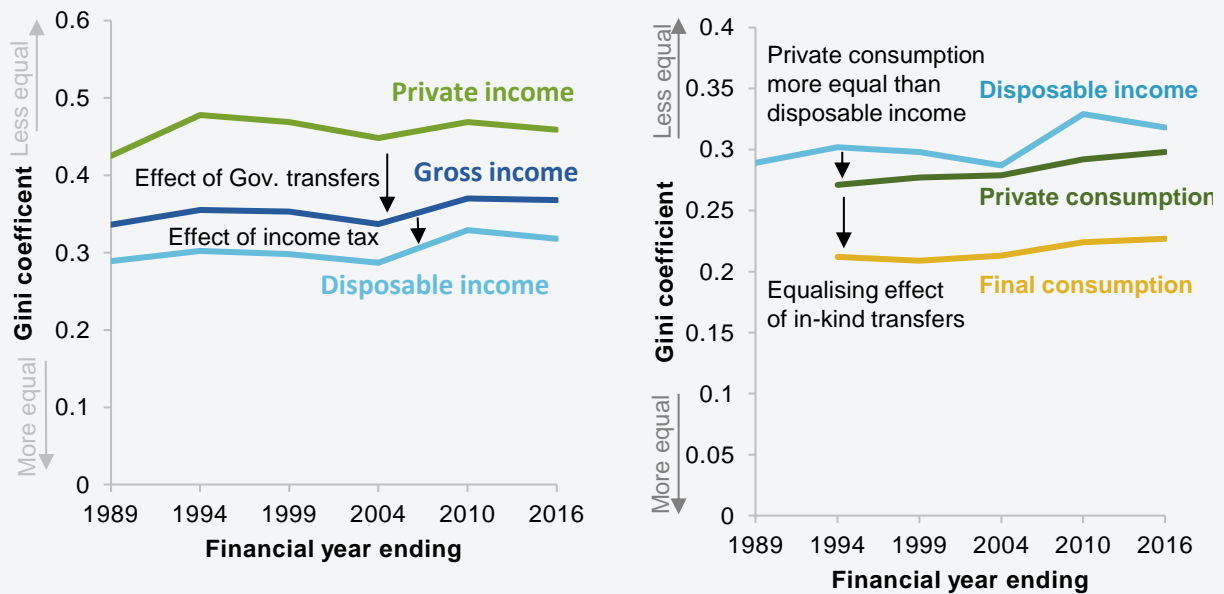
Source: Panel a & b: Productivity Commission estimates using ABS (Microdata: *Household Expenditure, Income and Housing, 2015-16*, Cat. no. 6540.0, released 25/10/17) and ABS (*Household Expenditure Survey Basic confidentialised unit record file for 1988-89* as available at 25/10/17). Panel c: Wilkins et al. (2020).

Box 1.5 – Well targeted redistribution by governments significantly reduces inequality in Australia

While income inequality has remained steady over the past few decades, Australia’s progressive tax and highly targeted transfer systems substantially reduce the level of inequality at a given point in time. For example, an often-used measure of income inequality, known as the Gini index (which rises as income inequality increases) reduces consistently as government transfers (such as unemployment benefits and rent assistance) and income taxes are applied to private incomes. Similarly, the Gini index for final consumption, which includes in-kind government transfers such as health, education and social housing, is lower than both final consumption, which in turn is lower than for disposable income (which likely reflects access to finance and savings behaviour). In effect, government policy has meant that while an individual’s (or a household’s) income from work and investments can be volatile over time, their actual spending on goods and services is usually much more stable. This indicates that redistribution, while imperfect, does act as a form of insurance against income shocks.

Box 1.5 – Well targeted redistribution by governments significantly reduces inequality in Australia

The impact of redistribution on measures of inequality^{a,b}



a. The Gini index is a measure of inequality ranging from 0 (completely unequal) to 1 (perfectly equal) that is calculated by comparing the actual cumulative proportional distribution of income to the counterfactual cumulative distribution if the society was completely equal. b. Private income refers to income before tax and transfers, disposable income is income after taxes and transfers and final consumption is private consumption plus in-kind service received for health and education.

Source: PC (2018, pp. 54, 65).



**Finding 2.6
Productivity and the safety net**

Consumers have received large benefits from productivity growth, including the capacity to benefit from a broad government social safety net.

Accounting for environmental impacts

As with any manifestation of progress in the economy, productivity growth can give rise to either negative or positive environmental outcomes associated with the destruction, or preservation (respectively), of natural land and water resources.

Creating more and higher quality goods and services from the use of fewer inputs can lessen the use of scarce natural resources and reduce adverse environmental impacts, as well as returning more leisure time to people to enjoy environmental assets.

If there are no markets to provide an indication of how different environmental outcomes are valued, or regulations to influence behaviour to achieve environmental outcomes valued by the community, then this can mean there are environmental consequences of productivity growth that detract from people's wellbeing.

Input and output prices are the fundamental market signals that help businesses allocate resources to the production of goods and services, and (in the case of output prices) provide information to consumers to make consumption choices.

When prices are incomplete (because the prices for certain inputs and outputs are themselves missing, typically because of an absence of property rights, markets, regulation or information), market participants will tend to over or under produce certain outputs, relative to levels which maximise the community's well-being.¹⁰ Missing prices tend to plague the use of 'common-property' natural resources, such as the Earth's atmosphere.

- In the 1980s the production of chlorofluorocarbons (CFCs) — a chemical used in fridges, air conditioners and aerosols — was found to be destroying a part of the Earth's stratosphere known as the ozone layer. A depleted ozone layer leads to an increase in ultraviolet light reaching the earth from the sun, which tends to increase the rate of skin cancers and cataracts in humans, as well as being deleterious to marine and terrestrial ecosystems. This damage was not reflected in the price of products (nor initially in non-price regulations) that contained CFCs.
- A scientific consensus was reached in the 1990s that greenhouse gas emissions associated with the production of fossil fuel-based energy (burning coal or gas in power plants and petrol in cars) were influencing the climate, leading to, amongst other things, more frequent and more destructive weather events. This damage was also not reflected in the price of products that directly or indirectly used fossil fuels.

In both of these cases, damage is caused, which detracts from income growth, but the lack of an explicit market price (associated with CFC and carbon emissions) means that economic harm is poorly measured, or not measured at all (box 1.6).

Box 1.6 – Accounting for the environmental impact of carbon emissions: a stylised example

Some economists have experimented with applying a hypothetical market price to certain environmental outcomes to investigate the potential impact on economic outcomes. An example of this for Australia is putting a hypothetical price on carbon dioxide emissions (a price or cost per tonne of emissions) with an eye to estimating an 'emissions cost', which could then be deducted from real GDP per capita (figure).

Imputing a price to carbon emissions has the effect of reducing the estimate of past GDP but increasing the estimate of recent GDP growth. In other words, the failure to count carbon emissions as a cost has led in the past to an over-estimate of GDP levels and an underestimate of GDP growth, as carbon emissions fell between 2000 and 2020. For modest carbon price assumptions, these differences are relatively small.

This hypothetical example is an accounting exercise and does not purport to measure the economic impacts of an actual carbon price. It does not necessarily imply that if an actual carbon price had been imposed on the Australian economy in 2000 that incomes — and wellbeing — would have been lower.

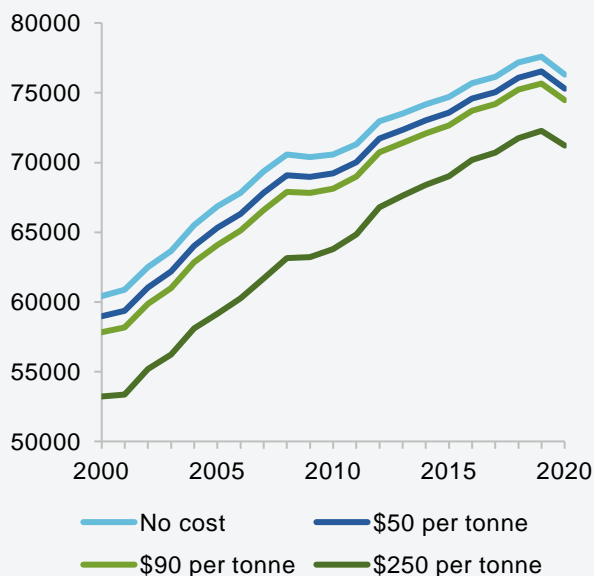
¹⁰ This can be problematic when outputs, either directly (cigarettes and alcohol) or indirectly (pollution), detract from income and harm wellbeing. Similarly, regulations that, for example, lock up natural environments in the absence of a market price carries an opportunity cost that may, to the extent that it bans productive uses, also detract from well-being.

Box 1.6 – Accounting for the environmental impact of carbon emissions: a stylised example

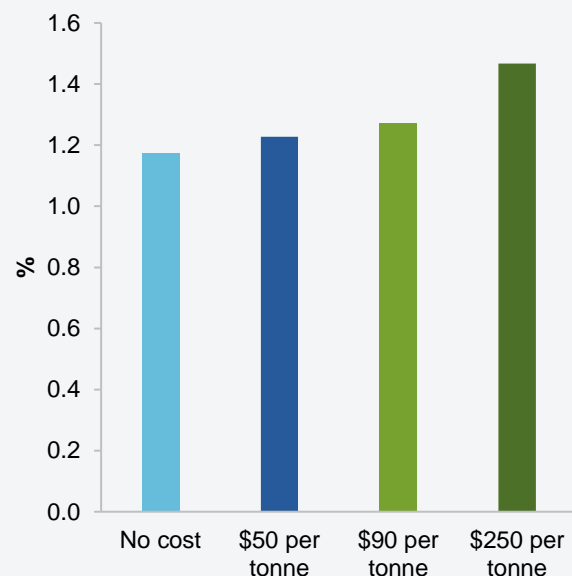
Rather the examples serve to demonstrate the benefits of having a more complete view of the environmental impact of growth, either incorporated in or as a supplement to, measures of average income. The example also assumes that Australia can wholly capture the benefits (and costs) of any emissions reductions undertaken here. But ‘carbon leakage’ and offsetting actions by other countries means this is unlikely the case. Moreover, because we do not know the cost of reducing emissions in the past, we do not know whether we could have been better off by not cutting emissions as much as we have. In other words, we do not know the net benefits of cutting emissions.

Accounting for carbon emissions decreases the measured level of incomes but increases measured growth rates^a

a. GDP per capita levels



b. GDP per capita annual growth (1999-00 to 2019-20)



a. The value of a tonne of carbon dioxide emissions is assumed to be constant over time.

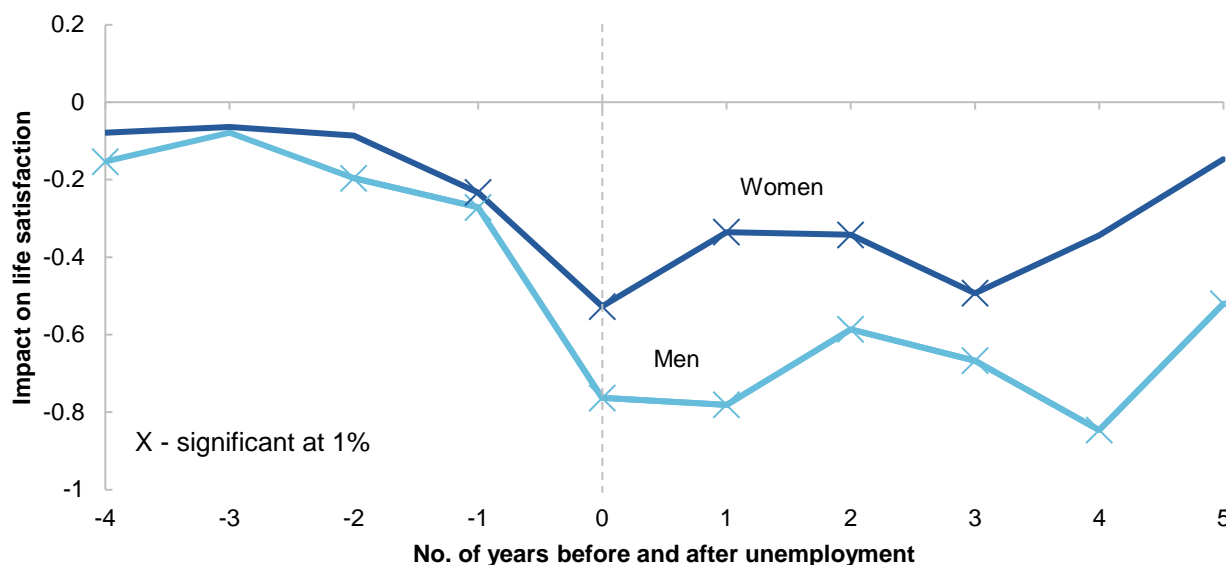
Source: Productivity Commission estimates using ABS (*Australian System of National Accounts*, 2019-20 financial year, Cat. no. 5204.0, table 1); DISER (2021).

Productivity can be an imperfect reflection of wellbeing

Productivity statistics are not designed to explicitly measure wellbeing. While productivity growth equates to higher real wages and higher consumption on average, most people consider their well-being with reference to more than just the volume of goods and services that they can purchase.

Quality of personal relationships, a sense of fulfilment in life, mental health status, all play a role in how individuals rate their subjective well-being. The well-being of individuals is a function of their *own* economic outcomes (figure 1.9) but can also be related to their perception of the economic outcomes experienced by other people — for example, whether or not they perceive equality or fairness in the distribution of economic resources throughout society.

Figure 1.9 – The effect of unemployment on life satisfaction^a



a. Reproduced from analysis of data from the German Socio-Economic Panel Study between 1984 and 2003. Life satisfaction is measured on a 10-point scale.

Source: Clark et al (2008).

While productivity is not a direct measure of well-being, in practice it is a key input and often a correlate. The level of productivity across countries correlates with numerous measures of well-being and environmental outcomes (figure 1.10). Countries with higher productivity tend to have longer life expectancies, rate their life satisfaction higher and have lower levels of income and wealth inequality.¹¹

The positive cross-country correlation between productivity and various measures of well-being likely reflects that many measures are in fact highly correlated with material wealth and relative abundance. That is, productivity improvements explicitly (for example, health related innovations that prolong life) and implicitly improve well-being by creating additional income for given amounts of effort.

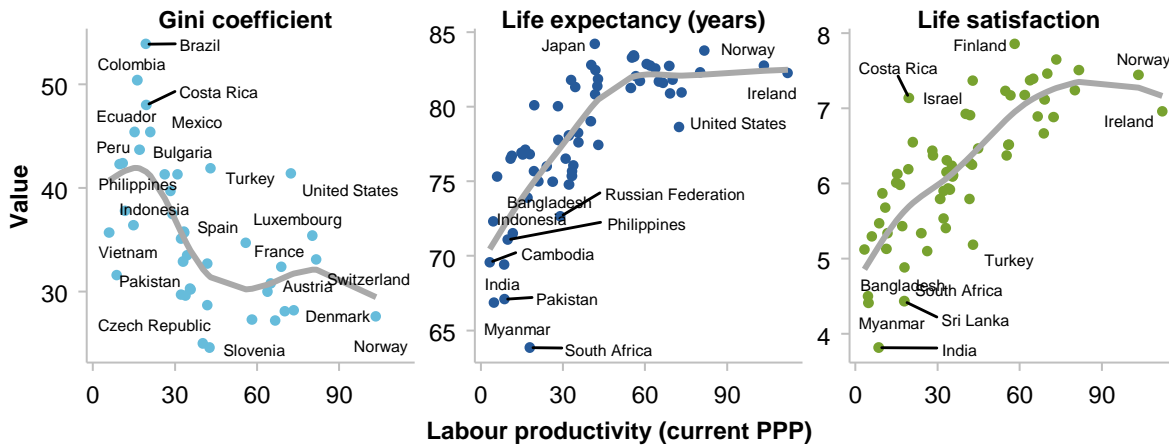
This means the productivity dividend has potential to ‘lift all boats’. It can be redirected by individuals into consumption of goods and services that directly improve their own subjective well-being, and by businesses and entrepreneurs into innovation and further investment. But governments can also redirect the dividend on behalf of the community into areas that improve well-being for those who for whatever reason, may not directly benefit from productivity growth (unemployment benefits, publicly funded education and health care). In this way, productivity growth is a positive policy objective.

To a certain degree, welfare improvement may be better assessed not by jettisoning traditional productivity estimates but by considering a broad suite of welfare indicators in addition to productivity and income, such as measures of inequality or disadvantage for particular groups.

¹¹ For some measures of wellbeing, such as subjective happiness, the story is less conclusive, with some arguing that the correlation can be negative across time within the same country (for example Easterlin et al. 2010; Easterlin and O’Connor 2020; Stevenson and Wolfers 2008).

Figure 1.10 – Productivity correlates with many other policy objectives^{a,b}

Cross country comparison of labour productivity (current PPP) against various measures of policy objectives for 2019



a. Gini index ranges from 0 to 100 (higher is more unequal) and life satisfaction ranges from 0 to 10. **b.** Solid line is line of best fit using a natural spline.

Source: Productivity Commission estimates using Feenstra, Inklaar and Timmer (2015).



Finding 2.7

Productivity provides the resources to improve wellbeing

Productivity growth is an imperfect measure of wellbeing, but higher productivity growth means more opportunities for individuals, businesses and government to devote resources to directly improving wellbeing.

2. Forces shaping Australia's productivity challenge

Key points

- * Australian productivity growth is at its lowest rate in 60 years. This broad-based slowdown has been observed across advanced economies.**

 - Australia's productivity performance in the goods sector, including mining and agriculture, is consistently strong when compared with global peers. Australia's services — which employs almost 90% of Australian workers and accounts for about 80% of economic activity — are comparatively less productive.
 - Australia has slipped down the productivity rankings recently and has instead maintained its rich country status largely through increasing the share of people in the workforce.
- * The Australian economy faces challenges bouncing back from its recent poor productivity performance. These include:**

 - Continuing increase in the size of the services sector, where productivity growth has historically been more difficult to achieve than in the traditional goods sectors (e.g. mining, manufacturing and agriculture).
 - A fast growing, government funded and regulated, non-market services sector (e.g. aged care, schools, childcare and disability services), where a lack of competition and contestability can mask underperformance and the freedom to innovate and the sharing of new approaches can be limited.
 - Impacts of climate change and the task of decarbonising the Australian economy in line with international commitments.
 - Threats to open and flexible international markets for trade, capital and labour — which has benefited Australia enormously in the past — as some countries turn inwards in the face of increasing global tensions.
- * COVID-19 prompted an acceleration in the uptake of digital technologies across the Australian economy and showed that when governments, businesses and households worked together they could adapt quickly, including to remove long standing productivity bottlenecks.**
- * As the economy evolves in the wake of COVID-19, increased digital capacity could lead to a productivity dividend, particular in the services sector. Taking advantage of the opportunities afforded by digital technology — such as online service delivery, artificial intelligence and data analytics — will require:**

 - governments and businesses continuing to adopt and adapt innovative business models.
 - a suitably skilled workforce (and training infrastructure) adept in non-routine tasks.
 - access to data, much of which is collected through businesses reliant on funding or regulation of governments, is not unduly locked down.

Australia has maintained its position as a relatively high income, high living standard economy for the past 200 years thanks to consistent, long-term growth in productivity. However, over the past decade, in line with most advanced economies, Australia's rate of productivity growth has slowed significantly. Indeed, the Australian government has officially acknowledged the productivity slowdown, reducing the productivity assumption underlying its annual economic forecasts from 1.5% to 1.2% (box 2.1).

Several contemporary forces will likely shape productivity growth in the future — as well as influencing whether, and to what extent, the economy can bounce back from this slowdown.

- A growing services sector: The Australian economy, like most other advanced economies, is now dominated by services, which account for about 80% of production and 90% of employment. Historically at least, achieving productivity growth has been relatively difficult in services, particularly when compared with the rapid gains seen in the more traditional goods industries, such as agriculture, manufacturing and mining. Some of the most significant areas of services delivery are those — such as healthcare, aged care, disability support and education — that are heavily regulated and have a substantial reliance on government funding.
- The recovery from COVID-19: The pandemic has highlighted deficiencies in digital infrastructure and how a lack of effective co-operation between governments, businesses and households in Australia can hobble the economy during a crisis. Changing priorities during the pandemic highlighted the need for consistent institutional structures and an adaptable workforce, while the labour shortages in the wake of the pandemic bring a greater focus on investment in labour-saving technology.
- Decarbonisation: Australia is richly endowed with fossil fuel-based resources, but the economy — and the country more broadly — is highly exposed to downside risks associated with climate change. Decarbonising the economy in line with international commitments over the next thirty years will have a non-trivial bearing on productivity outcomes.

Box 2.1 – The projected impact of slower productivity growth on income and leisure

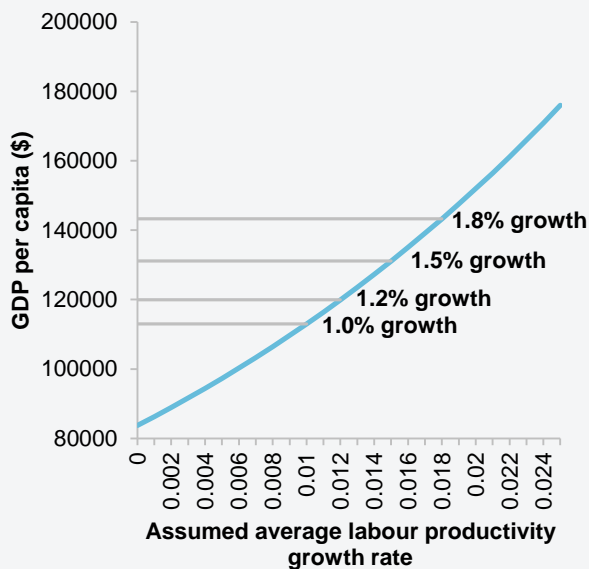
In the 2022-23 Australian Government Budget the productivity assumption was revised down to 1.2% from 1.5% (Commonwealth of Australia 2022).

This seemingly trivial downgrade implies that for average Australians, future incomes over the next 40 years (the timeline considered in the Australian Government's Intergenerational Report) are projected to be almost 20% lower than they would otherwise be.

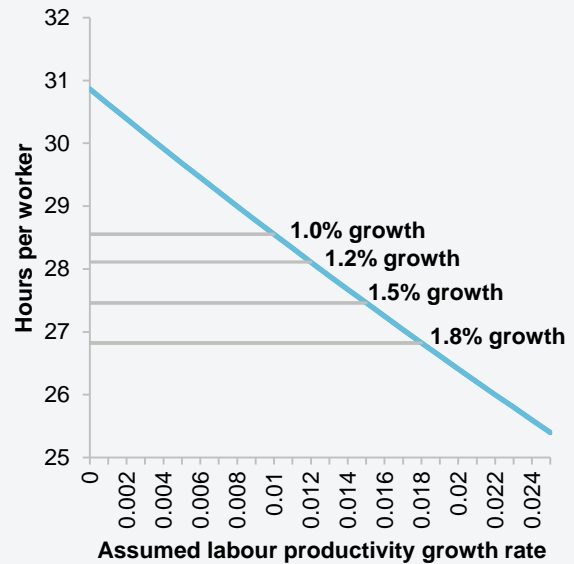
And compared with the average over the past 60 years (1.8%), 1.2% productivity growth implies about 40% less growth in projected future incomes and the working week will be 5% longer (figures).¹

Box 2.1 – The projected impact of slower productivity growth on income and leisure

a. GDP per capita in 2061-62 for different rates of average productivity growth^a



b. Average hours per worker in 2062 for different rates of productivity growth^a



a. Estimates of GDP in 2021-22 taken from national accounts, estimates of hours worked taken from Labour Account while estimates of employment taken from Labour Force Survey.

Source: Commission estimates using ABS (*Australian System of National Accounts*, 2021-22 financial year, Cat. no. 5204.0, table 1; *Labour Account Australia*, June 2022, Cat. no. 6150.0.55.003, Industry summary table; *Labour Force, Australia*, October 2022, Cat. no. 6202.0, table 1).

¹ These projections are based on assumptions for forecasting incomes, productivity and working hours in 2062.

- The roles of capital deepening and multifactor productivity in driving labour productivity growth have not been separately delineated. Relatedly, this model only considers gross measures (such as GDP and labour productivity), and so the role of depreciation in decreasing incomes will not be considered.
- The employment to population ratio is the same as its present value. This is similar to the forecasts in the Intergenerational Report, which have participation rates falling from 66.3% to 63.6% between 2021 and 2061 (Commonwealth of Australia 2021, p. 35)).
- While the number of employees is fixed exogenously, working hours per worker decrease proportionally with labour productivity about the rate at which they have since 1950. Historically, for every 10% increase in labour productivity, average hours per worker fall about 2% (estimated using Feenstra, Inklaar and Timmer (2015)). This assumption was used to forecast average working hours given.
- The role of international borrowing and investing as well as the terms of trade have been ignored.

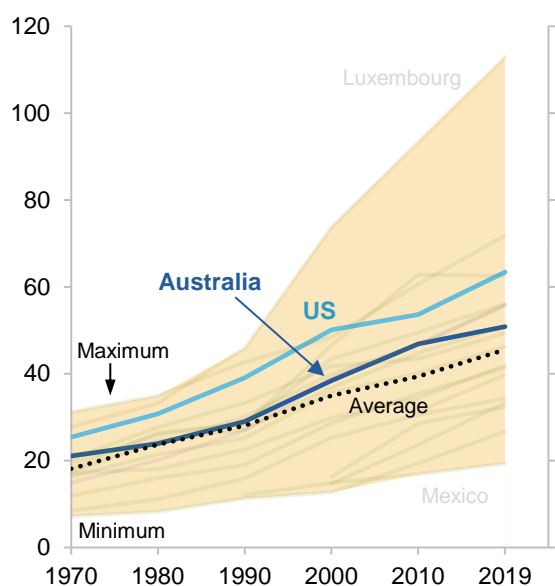
2.1 Australia's recent productivity performance

Consistent, but overall, not world leading ...

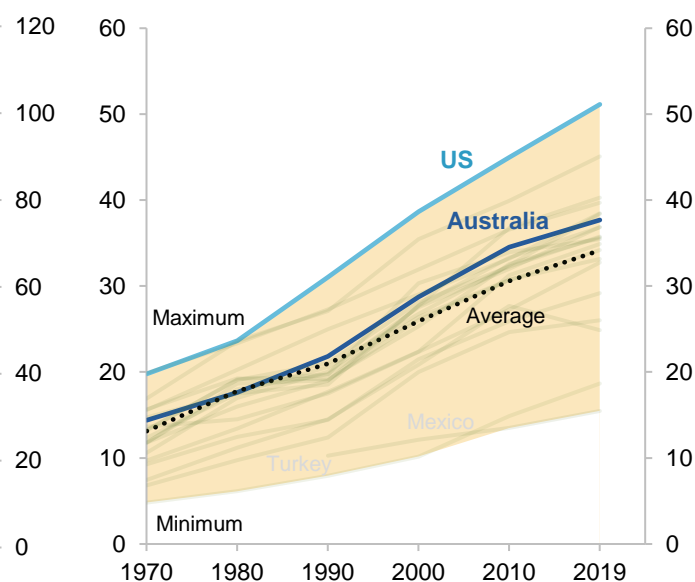
The Australian economy has maintained a relatively high standard of living throughout the past hundred or so years. More recently, over the past five decades Australia has experienced healthy growth in real incomes — up 250% between 1970 and 2019 (figure 2.1) — and today, Australia remains a relatively rich economy with consumption levels well above average.

Figure 2.1 – Income and consumption amongst OECD economies

a. GDP per capita^a (\$'000s)



b. Consumption per capita (\$'000s)^{a,b}



a. OECD membership has changed over time. To reflect this, the group of countries included in the 'OECD' calculations here changes based on the nearest decade at which the country ratified membership. Measured at chained PPPs in million 2017US\$ using data from 2019. OECD average is weighted by country population. **b.** Consumption is real consumption of households and government, at current PPPs (in mil. 2017US\$).

Source: Feenstra, Inklaar and Timmer (2015).

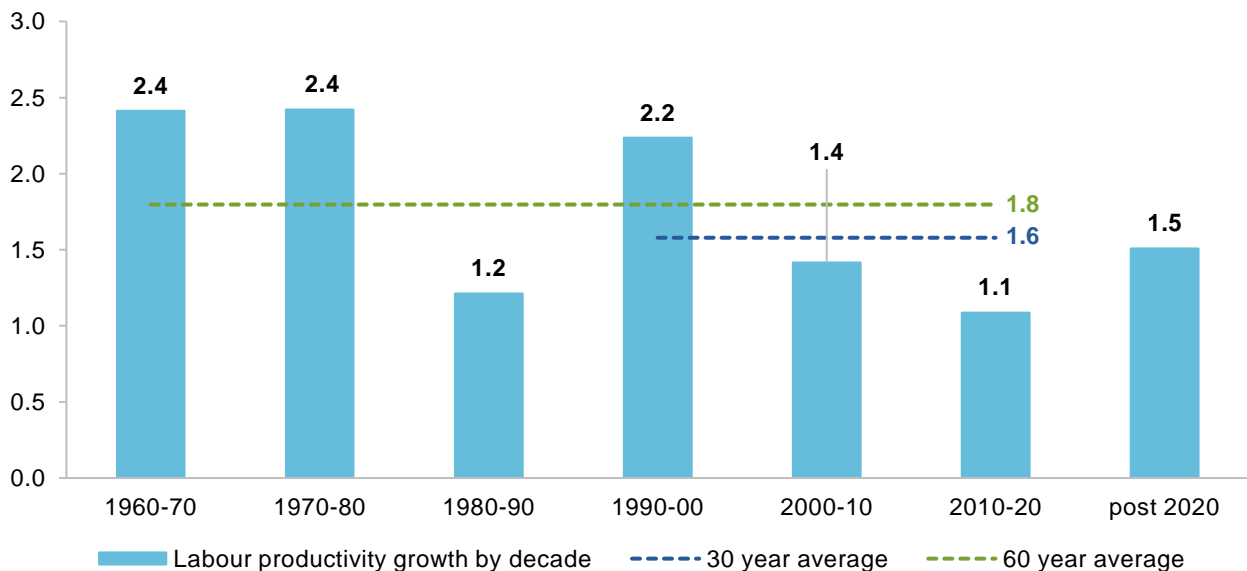
Despite its strong income and consumption performance, Australia's productivity growth has slowed significantly in the past decade, falling to its lowest rate since the 1970s (figure 2.2). To put this in perspective, if, over the decade, productivity had instead grown at an annual rate consistent with the average over the past 60 years (1.7% compared with 1.1%), gross national income per person would have been about \$4 600 higher (6%) in 2020 (ABS 2021a).

Australia's performance should be placed in a global context. There has been a widespread and sizable slowdown in productivity growth across most advanced economies recently.¹² For example, average

¹² Exactly why productivity growth has slowed is contested, as are the implications for future growth. The economics literature identifies a number of potential culprits, which range from measurement error to fundamental changes in the structure of the economy. Key sources include Gordon (2018), Mokyr (2018) and Syverson (2017).

productivity growth among OECD economies since 2005 was about one percentage point per annum below the historical average (figure 2.3).¹³

Figure 2.2 – Australia's labour productivity growth in the past decade has been the slowest in 60 years^{a,b,c}



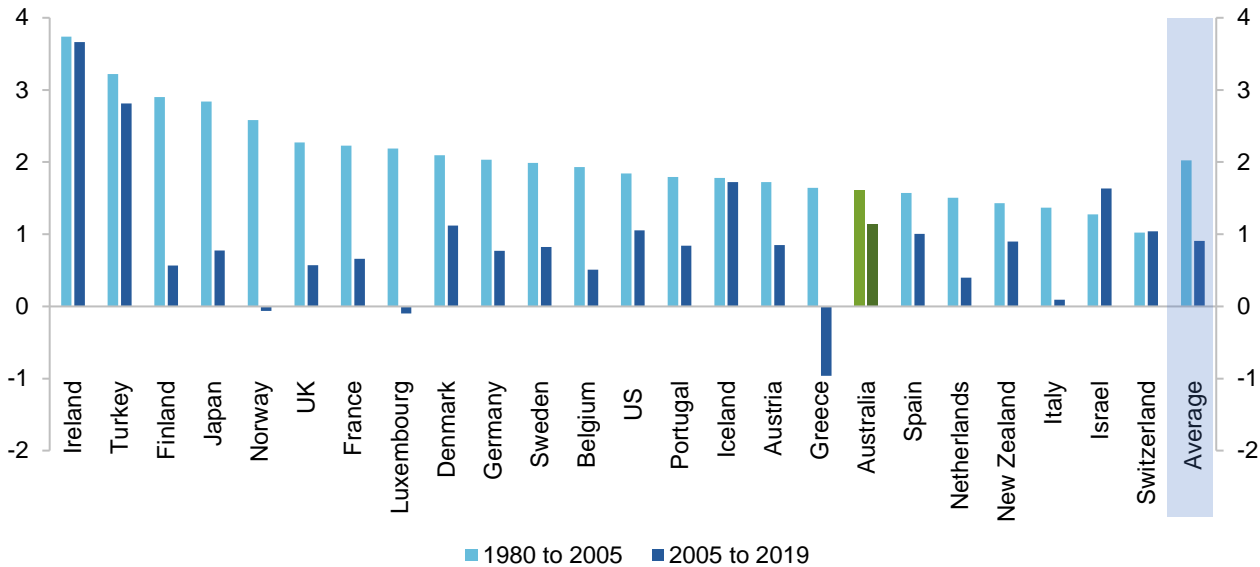
a. Labour hours from 1960 to 1980 come from the Penn World Tables. **b.** All years are the financial year ending in that year. So the range 1960–1970 is actually 1959–60 to 1969–70 but has been shortened for readability. **c.** The period averages are based on the 2021 ABS Annual National Accounts. The average annual productivity growth rate over 30 years to June 2020 is 1.6%, compared with 1.5% reported in the 2021 Intergenerational report (Commonwealth of Australia 2021) for the 30 years to June 2019.

Source: Productivity Commission estimates using ABS (*Australian System of National Accounts*, 2020–21 financial year, Cat. no. 5204.0, table 1); Feenstra, Inklaar and Timmer (2015).

¹³ From a global perspective, the slowdown is particularly evident in advanced economies; developing countries are growing faster than ever before. In fact, global income growth is currently the fastest it has ever been, with the living standards of some of the world's poorest countries improving at the fastest rate on record (Bolt and van Zanden 2020).

Figure 2.3 – Most OECD countries have experienced a productivity slowdown^a

Labour productivity growth in OECD countries (%)



a. Includes only the 24 longest standing OECD countries. For some countries, the average growth rate between 1980 and 2005 could not be calculated due to missing data for the 1980s. Countries where the average growth rate was calculated for a narrow window were: Austria (1995 to 2005), Greece (1983 to 2005) and Israel (1981 to 2005).

Source: OECD (2022b).



Finding 2.8

Productivity is growing at its slowest rate in 60 years

Australia’s productivity is growing at its lowest rate in 60 years, consistent with a broad-based slowdown in productivity growth among advanced economies.

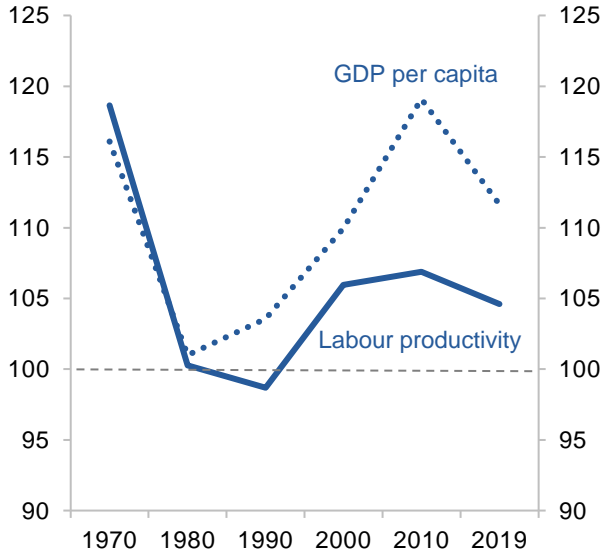
Despite maintaining a high income ranking since the 1970s, there has been a long-term decline in Australia’s relative labour productivity growth performance. Labour productivity has not recovered after falling behind in the three decades to 2000. Between 1970 and 2020, Australia’s labour productivity ranking fell ten places from sixth in the OECD, to sixteenth (figure 2.4).

Australia’s productivity is now about 22% lower than that of the United States — a country typically acknowledged as the ‘global frontier’ economy.

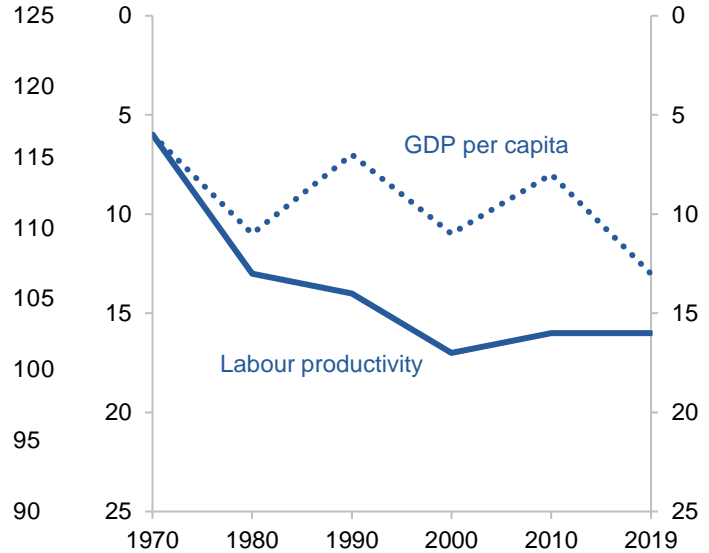
An important reason that the living standards of Australians have remained among the top tier advanced economies despite our middling productivity growth, is that a higher-than-average proportion of Australians work, and they work relatively long hours (figure 2.5).

Figure 2.4 – Australia's income position belies its middling productivity performance^a

a. GDP per capita and productivity % of OECD (OECD = 100)



b. Australia's GDP per capita and productivity by rank amongst OECD countries

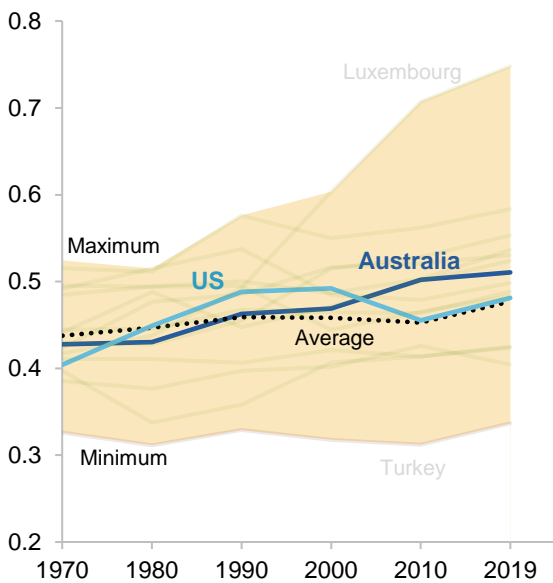


a. OECD membership has changed over time. To reflect this, the group of countries included in the 'OECD' calculations here changes based on the nearest decade at which the country ratified membership. Measured at chained PPPs in million 2017US\$ using data from 2019. OECD average is weighted by total hours.

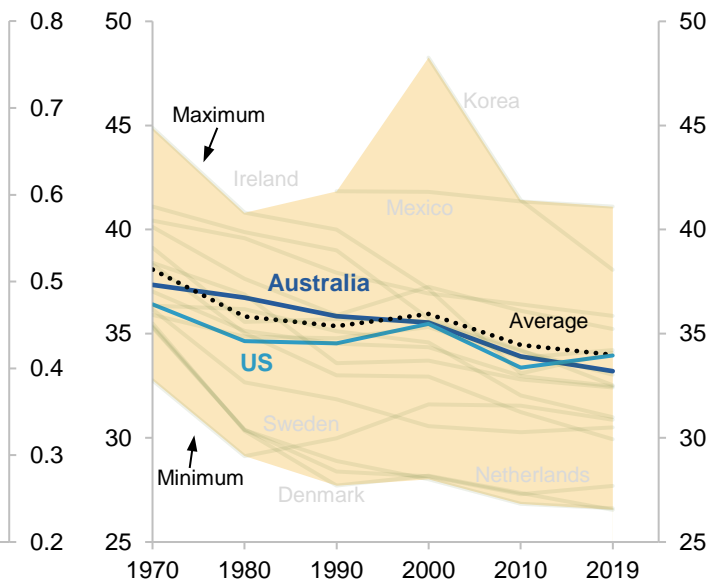
Source: Productivity Commission estimates using the Penn World Tables (eleventh edition).

Figure 2.5 – More Australians work, and they work longer hours^a

a. Employment to population ratio



b. Average weekly hours per worker



a. OECD membership has changed over time. To reflect this, the group of countries included in the 'OECD' calculations here changes based on the nearest decade at which the country ratified membership.

Source: Productivity Commission estimates using the Penn World Tables (eleventh edition).



Finding 2.9

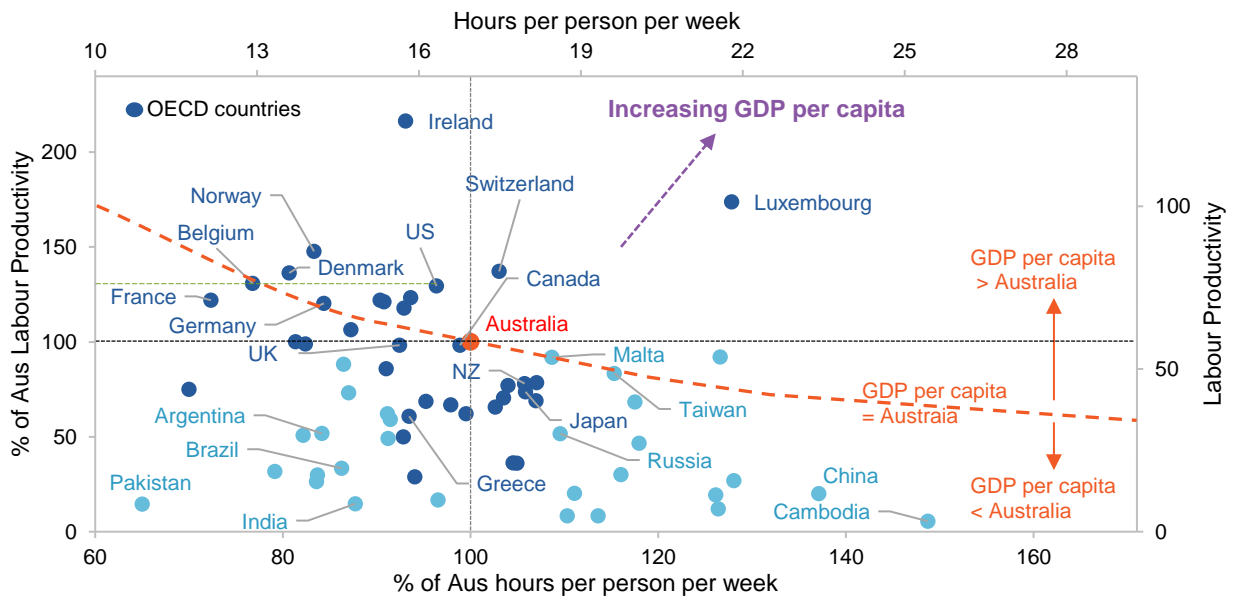
Increasing participation cannot substitute for sustained productivity growth

The increasing share of people in the workforce has shielded Australia from some of the effects of slowing productivity growth, but sustaining an ever-increasing share of people in the workforce (and maintaining their income levels) is neither possible nor desirable.

Australia’s employment to population ratio has increased since 1970, from 42% to 51%, moving from below the average to above the average in the OECD. (This is primarily due to a substantial increase in Australia’s female participation rate over the past 40 years, and a slight fall in the male participation rate (ABS 2022d)). Although average working hours in Australia fell by about 10%, or about 4 hours in the 5 decades to 2019, average hours amongst OECD peers fell more. In some European countries, such as Norway, Belgium and Denmark, average working hours fell by as much as 25% or more, or the equivalent of an entire standard working day for a full-time worker in Australia today (figure 2.6).¹⁴

On a per capita basis, Australians work longer hours than about 60% of their OECD peers. This maintains a relatively high level of GDP per capita (figure 2.6).

Figure 2.6 – Labour productivity and hours worked per head of population^a



a. Labour productivity is GDP per hour worked measured at chained PPPs in 2017US\$.

Source: Productivity Commission estimates using the Feenstra, Inklaar and Timmer (2015).

¹⁴ When making comparisons (and finding ‘learnings’) between Australia and other countries it is important to take the effect of labour utilisation into account. For example, some countries (e.g. France) with higher levels of labour productivity than Australia appear to have labour markets that exclude marginal members of the workforce (lower participation and higher unemployment) and prevent workers from working longer hours where they might be less productive (by restricting the length of the working week). Tax and other policy settings also affect labour utilisation and participation. In some countries, higher measured productivity levels could be the result of policy settings which prevent less productive workers from participating in the labour market.

In principle, if Australia could close the relative productivity gap it would bring significant benefits for the average Australian in line with the productivity dividend described in chapter 1 (box 1.4). For example:

- if Australia's labour productivity were at the same level as Belgium — a country with a very similar GDP per capita to Australia (the dashed line in figure 2.6) — Australian's per capita hours worked could be about 4 hours fewer per week without any reduction in income. This would translate to about one fewer day per week for each working Australian, other things equal — a leisure dividend
- alternatively, with a shift in productivity such that it was in line with Belgium, but with a more modest reduction in hours worked — about 0.5 hours fewer per capita, or just over an hour per week for the average Australian worker — Australia's GDP per capita would increase by about 25%, in line with the average American — a consumption dividend (figure 2.6).



Finding 2.10

Closing the productivity gap requires working smarter

Closing the productivity gap to our OECD peers requires working smarter so that Australia can have higher GDP per capita without having to work longer.

Goods sector productivity is strong, but services continue to lag

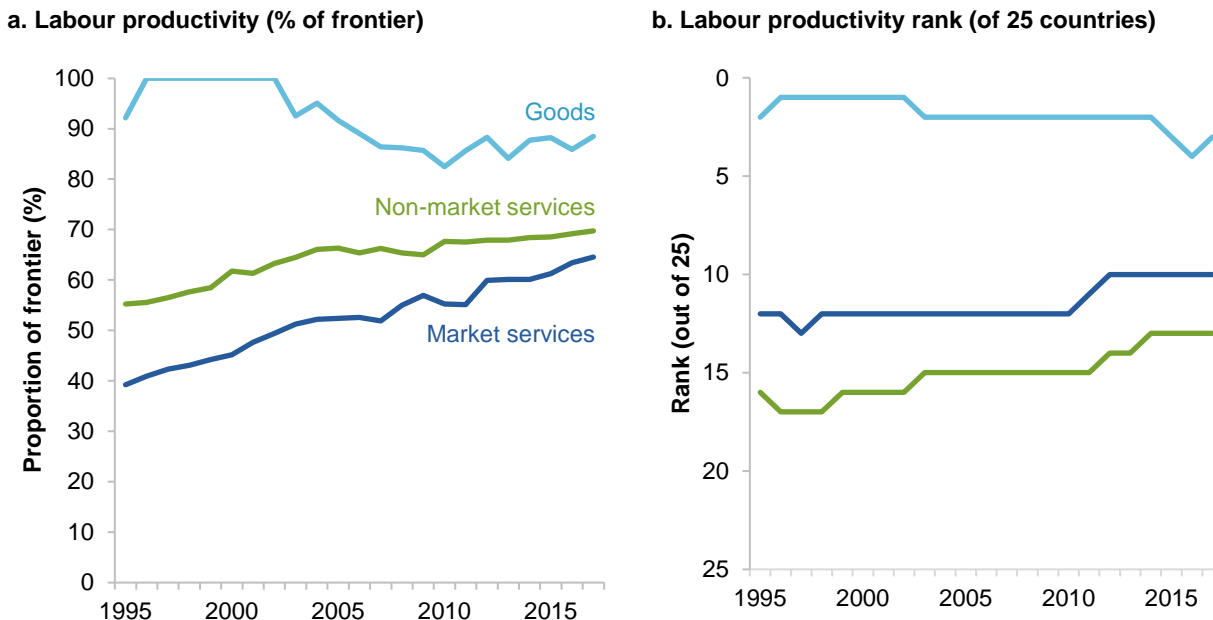
Australia's goods sector has performed relatively well over the past two decades when compared with European countries, the United States and Japan (figure 2.7).¹⁵ The relative performance of the services sector is less impressive, but both sub-sectors (non-market and market) are steadily improving.

Breaking each sector into its component parts shows that in the goods sector, agriculture and mining consistently perform at, or within, the top 5 countries. The ranking for the manufacturing sector — which accounts for about 5% of the Australian economy — has continued to slide after the peak of the mining investment boom in the early 2010s.¹⁶

¹⁵ Cross-country, industry-level, labour productivity statistics are constructed by estimating industry-level purchasing power parity (PPP) adjustments using the most recent internationally available estimates from 2014. These estimates should be interpreted cautiously. Aggregated results (whole economy or sector level) are more reliable than industry-level results due to the uncertainty regarding the pricing differences across countries for particular products and industries. Further, the relative ranking of countries is more robust than the particular estimates themselves. This has been confirmed in comparisons of multi-country productivity datasets which vary significantly in their absolute (and growth) estimates but vary little in their rankings of different countries.

¹⁶ The cause of this decline may be related to 'Dutch Disease', associated with the mining investment boom whereby the strong resources sector raises the value of the Australian dollar and reduces the relative competitiveness of the manufacturing sector.

Figure 2.7 – Australia’s labour productivity performance is strong for goods, but much weaker — although improving — for services^{a,b,c,d}

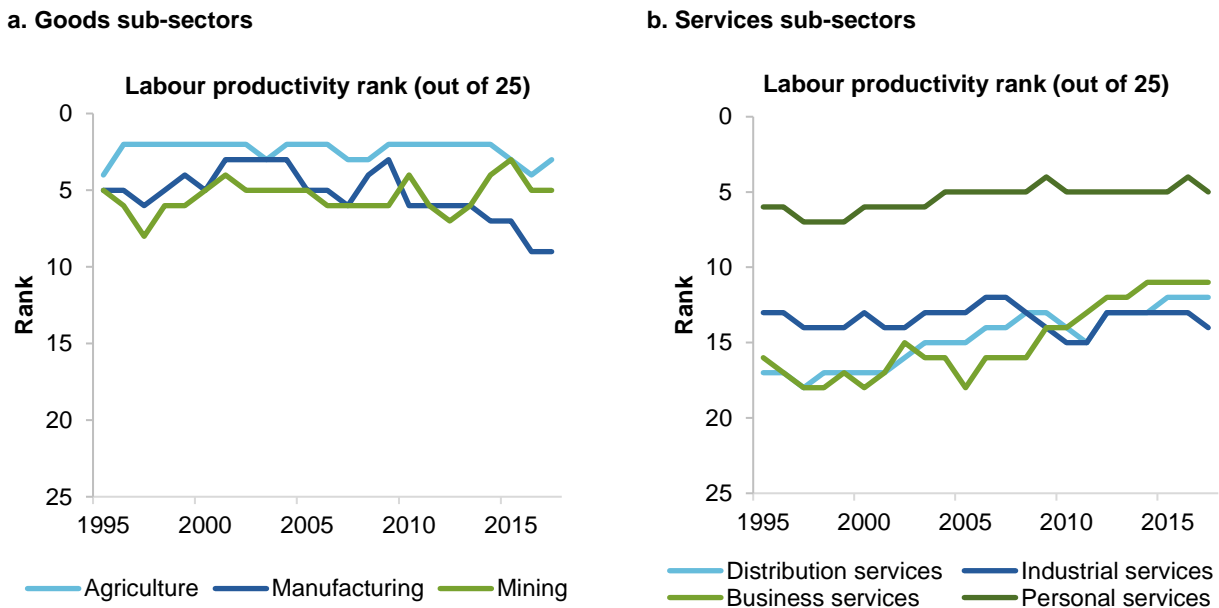


a. ‘Frontier country’ refers to the country with the highest labour productivity in a particular industry or sector in a particular year. Using the frontier country as a benchmark leads to more stable results than a constant benchmark country (e.g. the United States). **b.** Goods encompass manufacturing, mining and agriculture; market services includes all services other than non-market services and non-market services are education, health care and public administration and defence. **c.** The comparator set includes 25 countries, 21 of which are in the OECD (Australia, Austria, Belgium, Bulgaria, Cyprus, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Croatia, Hungary, Ireland, Italy, Japan, Lithuania, Luxembourg, Latvia, Malta, Poland, Slovenia, Sweden and the United States) plus Bulgaria, Cyprus, Croatia and Malta. Data limitations make comparisons to a broader array of countries difficult. **d.** The PPP benchmark year is 2014, these level estimates were then extrapolated using estimates of labour productivity growth. This means results closer to the 2014 benchmark year are more reliable than those well before or well after this date.

Source: Productivity Commission estimates using the World Input Output Tables, UN Comtrade data and unpublished data from the World Bank International Comparisons Program.

Services are characterised by a clear separation in relative performance between *personal services* (such as hotels, cafes and gyms), which ranks consistently in the top 5 countries, and the *professional, non-market and distribution services*, where performance is improving (in the face of the broader advanced economy productivity slowdown) but remains outside the top 10 (figure 2.8).

Figure 2.8 – Manufacturing and industrial services are Australia's productivity laggards



a. Distribution services are transport and postal, IT and telecommunications and retail and whole trade; industrial services are construction and utilities; personal services are food and accommodation and arts and recreation; and professional services are professional, scientific and technical services, real estate, finance and administration and support services. **b.** See notes c and d in figure 2.7.

Source: Productivity Commission estimates using the World Input Output Tables, UN Comtrade data and unpublished data from the World Bank International Comparisons Program.



Finding 2.11

Australia's relative productivity is high in goods but low in services

Australia's relative global productivity performance is strong in the goods sector, which includes mining and agriculture. Services are comparatively less productive on average, but our rankings are improving.

2.2 Forces shaping future productivity growth

As Australia continues to become a more services-centric economy, real wages and national welfare will be increasingly dependent on services sector productivity. But driving productivity growth in (at least parts of) the services sector has, on average, been more difficult compared with the goods sector, which includes agriculture, manufacturing and mining.

In addition to the ongoing challenges presented by climate change and transitioning to a lower carbon economy, the global pandemic has disrupted production processes and service delivery in many industries. In some cases this has led to productivity gains but maintaining this momentum as Australia recovers from COVID-19, and embedding innovation over the long term, represent further productivity challenges.

The dominance of services

The services sector defies definition as it covers such a broad array of products from brick laying to neurosurgery. *The Economist* quipped that services are ‘products of economic activity that you can’t drop on your foot’ (The Economist nd). The services sector is by far the largest part of the Australian economy — almost 90% of Australian workers are employed in the services sector and it accounts for a little more than 80% of economic activity.¹⁷ Both of these figures have grown significantly over the past 70 years — from about 50% in 1950 (PC 2021b, p. 6).

The general increase in the overall size of the services sector, while the goods sector (agriculture, mining and manufacturing) has contracted, is a typical characteristic of the course of economic development in countries (PC 2021b, pp. 5, 7).

Over the past 35 years in Australia, the expansion of employment in the services sector has been mainly in government subsidised and regulated ‘non-market’ services — in particular, health care and social assistance — but also business services. Employment in distribution services (retail and wholesale trade, transportation and warehousing) has contracted. The pattern is slightly different when viewed as a share of the economy: the economic contribution of the difficult-to-measure non-market services has plateaued while the contribution of business services has increased in line with their share of employment (figure 2.9).¹⁸

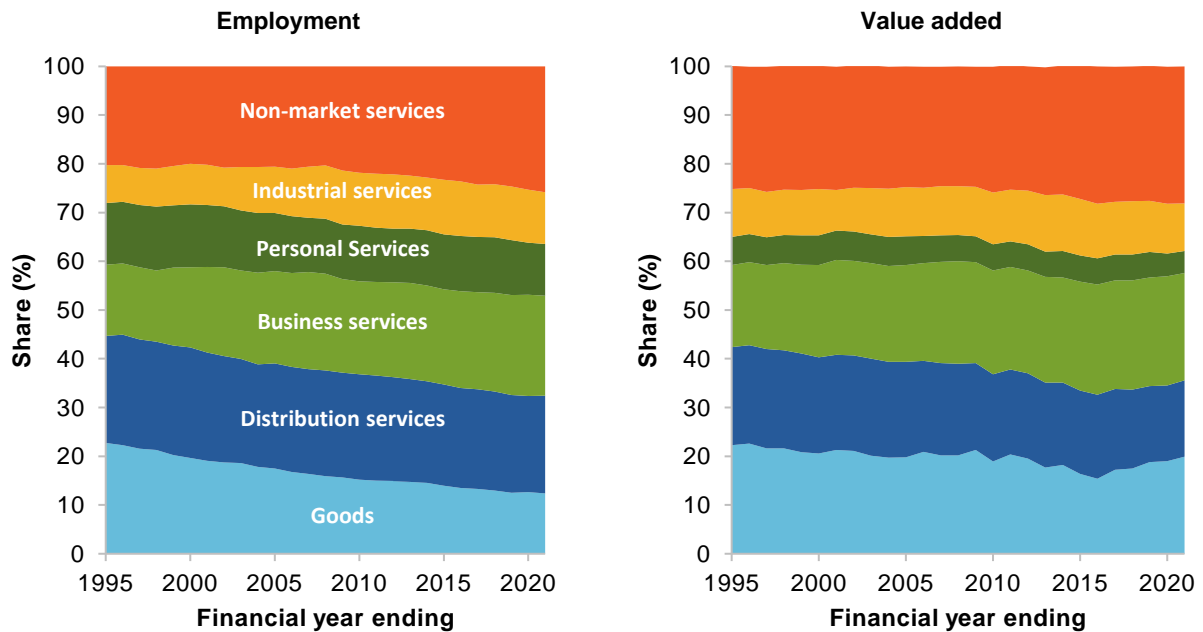
¹⁷ The ABS (2013b, 2019b) defines services as all products in the following divisions of the Australian and New Zealand Standard Industry Classification 2006: The Electricity, Gas, Water And Waste Services (Division D), Construction (Division E), Wholesale Trade (Division F), Retail Trade (Division G), Accommodation And Food Services (Division H), Transport, Postal And Warehousing (Division I), Information Media And Telecommunications (Division J), Financial And Insurance Services (Division K), Rental, Hiring And Real Estate Services (Division L), Professional, Scientific And Technical Services (Division M), Administrative And Support Services (Division N), Public Administration And Safety (Division O), Education And Training (Division P), Health Care And Social Assistance (Division Q), Arts And Recreation Services (Division R), and Other Services (Division S). Services also include Agriculture, Forestry and Fishing Support Services (otherwise part of Agriculture (Division A)); and Exploration and Mining Support Services (otherwise part of Mining (Division B)). The goods sector includes Agriculture, Mining and Manufacturing (Division C) except for Forestry and Fishing Support Services, and Exploration and Mining Support Services.

In this report, each services division is subsequently aggregated into five categories (a slight modification to the categorisation used in Connolly and Lewis (2010)): 1. Business, (Division K-N); 2. Industrial (Divisions D & E); 3. Personal (Divisions H, R & S); 4. Non-market (Divisions O-Q); 5. Distribution (Divisions F, G, I & J).

¹⁸ The productivity of the non-market sector is not regularly reported as part of the national accounts process because there are no market prices — a key building block in measuring productivity. Some irregular experimental measures of multifactor productivity are available for the hospital, higher education and schools sectors, and are very limited in their usefulness, not least because they are largely based on output measures — for example, in the hospital sector, number of diseases treated (PC 2017b).

Figure 2.9 – The increase in the share of the services sector is largely attributable to non-market and business services^{a,b}

Goods sector and services subsector shares of total employment and total gross value added



a. Employment is weighted by hours worked rather than a simple headcount of employees. **b.** See footnote 5 for a description of the categories.

Source: PC (2021b).

The services sector rise reflects our growing prosperity

The rise of the services sector is symptomatic of rising prosperity and productivity growth more broadly.

First, as economy-wide productivity has increased, higher incomes have led to more consumption of services compared with goods (that is, services demand is relatively responsive to income changes). Consumption of holidays, house-cleaning, afterschool care, gyms and home delivered food has grown faster than that of TVs, clothing and sports equipment (Beech et al. 2014).

Second, as productivity growth in goods sectors (such as manufacturing) outstripped the services sector average, the relative price of services rose. This phenomenon is often referred to as 'cost disease', or less pejoratively, 'the Penn effect' (Baumol 1967; Vollrath 2017). Because demand for many services has proven to be relatively unresponsive to price increases, overall spending on services has grown relative to spending on goods. On the supply side, the resources freed up by higher goods sector productivity flowed into the services sector, where productivity growth has been harder to achieve.¹⁹ That is, high productivity growth in 'progressive' sectors has led to a shift of labour and other resources to the less progressive sectors (i.e. those sectors with low productivity growth), which grow as a share of the economy overall. This in turn slows the overall rate of productivity growth across the economy. As economist Charles Jones (2021, p. 31) put it, 'Economic growth is determined not by what we are good at but rather by what is essential and yet hard to improve.'

¹⁹ Given the enormous diversity in services, cost disease does not affect all of them. Some services have not seen significant growth in consumption or prices as the economy has grown either because these services have productivity growth similar to the goods sector (such as distribution services or business services, discussed below) or because demand for these services is not closely tied to income growth, or rather it is responsive to price increases.

Hence, in many respects, the rise of the service sector is really the story of the decline in the relative share of the goods sector as the good sector has become more productive. A stark example of this is the agriculture sector, which has seen large increases in productivity while its share of the labour force has declined (box 2.2).

While the term ‘cost disease’ has negative connotations, it is arguably just a product of rising prosperity and productivity growth in some sectors of the economy.²⁰ So long as other parts of the economy demonstrate the twin properties of demand growing with income and productivity being slower than the economy-wide average, that part of the economy will tend towards some degree of cost disease.

But this does not make slow future productivity growth inevitable. It is simply the context for the productivity challenge. As long as the economy can continually evolve, finding new ways to innovate and raise productivity in those lagging (but growing) sectors, ongoing productivity and income growth is possible.

Box 2.2 – Will services productivity follow the path of agriculture?

At the beginning of the twentieth century, about 25% of all Australian employees — 371 000 people — worked in the agriculture sector. Collectively, this workforce produced just over 1 million tonnes of wheat, 239 million kg of wool and included about 9.4 million head of cattle. Flash forward to the end of the century and about 5% of Australian employees — 348 000 people — worked in the agriculture sector. But this workforce (and a lot of machines) now managed to produce almost 25 times more wheat (25 million tonnes) and over two and half times as much wool and head of cattle (642 million kg and 28 million head respectively). This smaller agricultural workforce is also both working more land and making the land they use more productive. In 1900, two hectares of land was required to produce about one tonne wheat, while in 2000 producing a tonne of wheat required about half a hectare of land — that is, the yield quadrupled.

A contracting agricultural workforce is not unique to Australia. In 1500, about 60% of workers in (what is now) the United Kingdom were devoted to agricultural production compared with about 1% in 2019. But how has productivity in the agricultural sector led to such large shifts in the structure of the workforce in Australia and elsewhere?

The main reason agriculture has seen a falling share of employment and output while its productivity has increased is a manifestation of Baumol’s cost disease — a combination of relatively rapid productivity growth within agriculture compared with the rest of the economy combined with consumer preferences. As productivity growth in agriculture increased it became more profitable to replace people with machines — threshers, reapers and tractors do the work of dozens of people (and animals). The other reason is that as agricultural and economy-wide productivity improved, there was increased demand for non-agricultural goods and services that led to higher wages in these sectors, and so attracted the surplus labour from agriculture.

By reducing the amount of labour required in agricultural production, Australia has been able to effectively redeploy additional workers to meet demands for other important needs and wants — doctors, nurses, teachers and even baristas — which were largely unmet in a predominately agricultural economy.

²⁰ A point forcefully made in Dietrich Vollrath’s ‘Fully Grown’ (Vollrath 2019).

Box 2.2 – Will services productivity follow the path of agriculture?

Will services repeat the same trend?

As the services sector grows in importance, the question arises as to whether it (or at least parts of it) will repeat the pattern observed in agriculture. That is, will some part of services have rapidly expanding output while its workforce contracts?

We have already seen the agriculture story play out in parts of the service sector. In 2004, the largest US video rental store, Blockbuster, had about 84 000 employees globally while in 2021 the largest streaming service Netflix, which along with similar companies largely replaced video rental, had only 11 600 employees. At the same time, while official numbers are unavailable, the number of views of video content on Netflix in 2021 was almost certainly higher than the number views of rental videos back in 2004 (with a larger variety and easier access). A similar story has played out in offices with the uptake of computer word processing power — fewer people are employed as typists or secretaries, but far more pages of documents are produced.



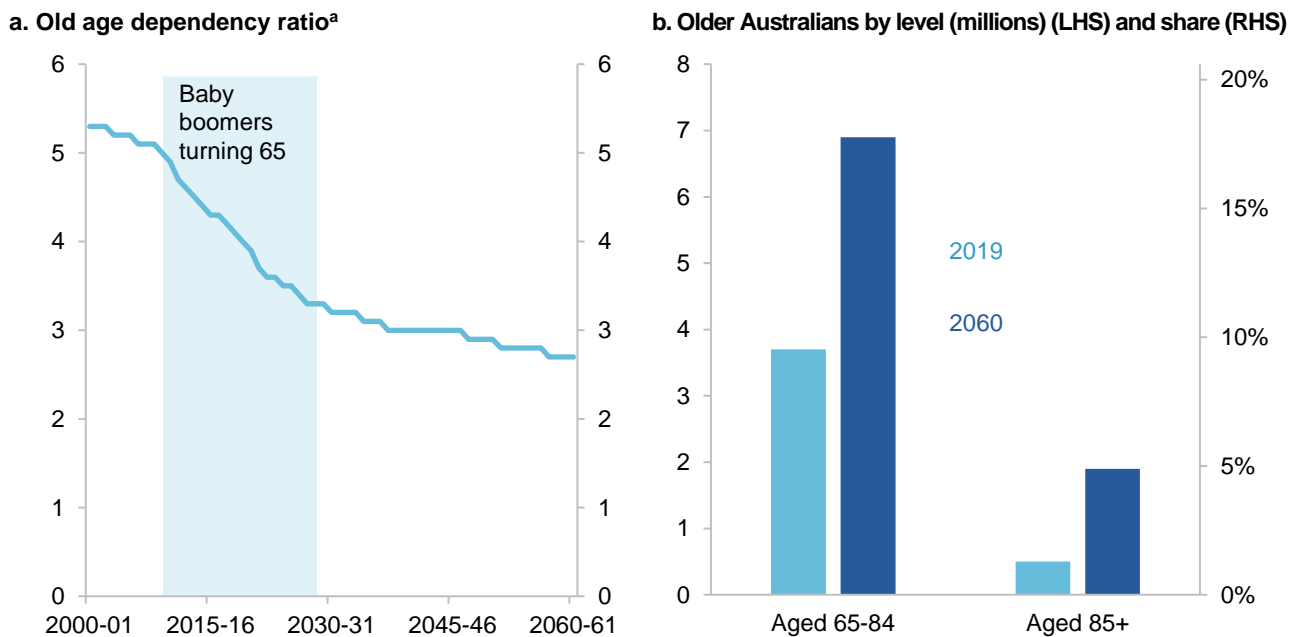
It remains to be seen how widespread the achievement of productivity improvements through similar such labour-saving approaches will be. But it is not obvious that these trends in labour use would necessarily be replicated in all parts of the services sector — particularly in services that involve non-routine tasks or non-cognitive experience — at least in the short term.

Source: ABS (2013a); Blockbuster Inc. (2004); Butlin (1969); Butlin, Dixon and Lloyd (2015); Netflix Inc. (2021); Roser (2013).

There are several other contributors to the increase in the share of the services sector. Global economic factors include the shift of the manufacturing base into East and South East Asia in the late twentieth century, which was driven by access to a large pool of relatively cheap labour. This shift was facilitated in Australia when domestic manufacturing was increasingly exposed to international trade via the removal of tariffs beginning in the 1960s. In some industries, outsourcing meant that a services component (such as sales or marketing) of what was a manufacturing operation, was outsourced and remained in Australia even after the manufacturing moved offshore.

Australia's aging population and shifts in other demographic factors contribute to an expanding services sector, especially the government run- and regulated non-market services. As our population ages, demand for health and aged care services increases, which is likely to weigh on productivity growth. The most recent Intergenerational Report projected that over the next 40 years the share of the population aged over 65 will increase to nearly 23% as the baby boomer generation ages (panel b figure 2.10). This will drive the dependency ratio — the ratio of working age people to non-working age people — down by almost a third, from 4 people today to 2.7 in 2060 (panel a figure 2.10). And consistent with the higher labour force participation of women, demand for childcare services is likely to at least keep pace with working age population growth.

Figure 2.10 – The aging population will further increase Australia’s services sector



a. Number of people of traditional working-age (15-64) for every person aged 65 and over.

Source: Commonwealth of Australia (2021).



Finding 2.12
Services dominate the economy

Similar to other advanced economies, the services sector dominates the Australian economy. This reflects both the impact of higher incomes on consumer preferences, and the fact that productivity gains have been harder to secure in many service industries — making services relatively more expensive. Australia’s industry structure also reflects our areas of comparative advantage (which for example, leads to a reliance on imported manufactured goods) and demographic factors such as an ageing population.

Productivity growth in services tends to lag the goods sector — though there is great variation

On average over the past 35 years, market-based measures of labour productivity have been higher in the goods sector than any subsector within the services sector (figure 2.11).²¹ But as discussed, services are highly diverse, including with respect to productivity growth.

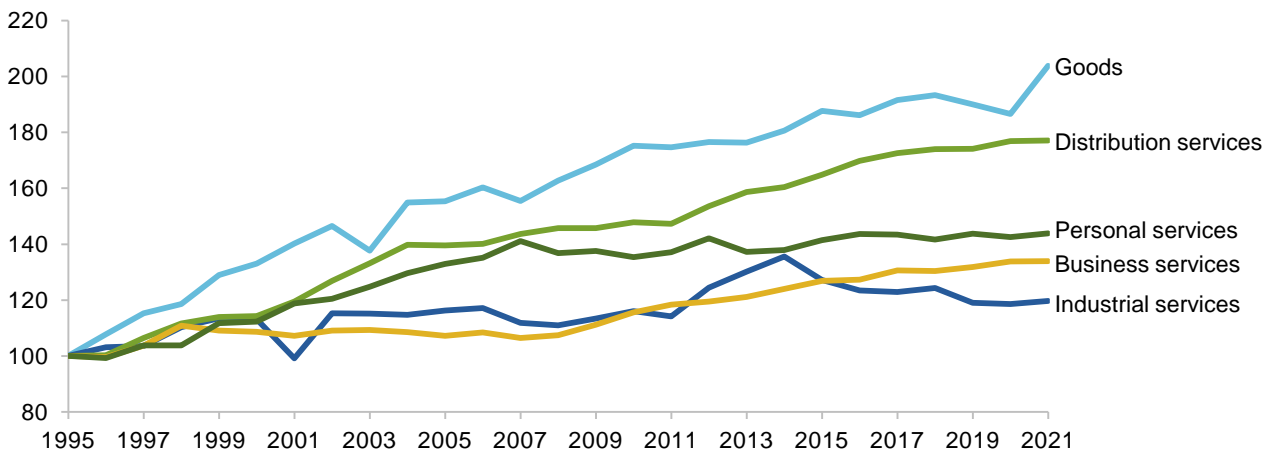
Since 1995, the services sub-sector with the fastest productivity growth was distribution services (which includes retail and wholesale trade, transportation and warehousing, and information media and

²¹ The figures in this section for the services subsector productivity performance differ from those presented in the ‘Things you can’t drop on your feet’ Productivity Insight report (2021b) due to data revisions by the ABS. These reflect, among other issues, the ABS’ move from the use of the labour account (from the labour survey) and revisions to several industries’ historical GVA estimates (ABS 2021b).

telecommunications). Growth in distribution services was about 7 times faster than in industrial services, the slowest growing sub-sector, but still about 15% slower than productivity growth in the goods sector.

Figure 2.11 – Labour productivity growth in Australia by subsector^{a,b}

Index (1995 = 100) between 1994-95 and 2020-21



a. Industries at the ANZSIC 1 digit level were aggregated into sectors by weighting the growth in labour productivity by the hours share of that industry (in the previous year). **b.** See footnote 17 for definition of services aggregation.

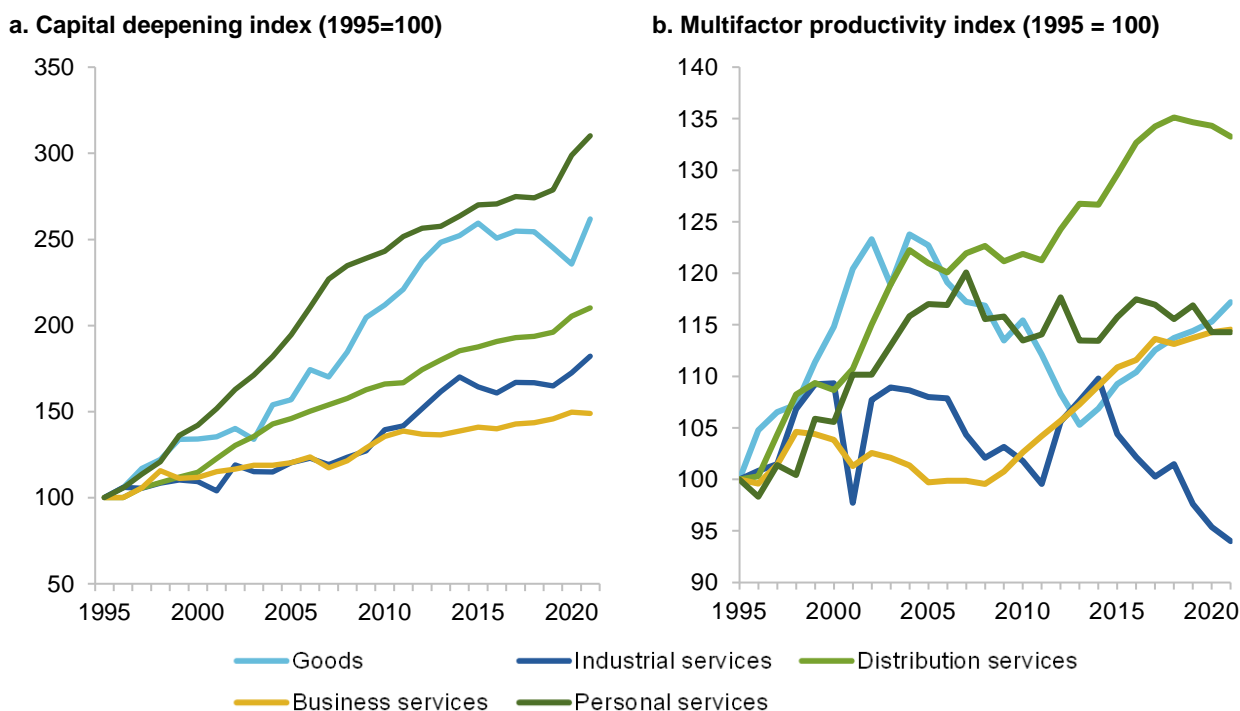
Source: Commission estimates using ABS (*Estimates of Industry Multifactor Productivity*, 2020-21 financial year, Cat. no. 5260.0.55.002, tables 1-19; *Labour Account Australia*, March 2022, Cat. no. 6150.0.55.003, Industry summary table).

The variation across sources of labour productivity growth — multifactor productivity (MFP) and capital deepening (appendix A.1) — for Australia's goods and services industries is significant (figure 2.12).

Since the mid-2000s, the goods sector's MFP growth has been broadly in line with most of the services sub-sectors but significantly slower than for distribution services — where average annual MFP growth was fastest. Ironically, given the broader upside benefits to Australia, a significant driver of the relatively slow goods sector MFP growth was the mining sector. The price shock that caused a terms of trade boom in the 2000s (box 1.3) made extraction of resources from low productivity mines profitable and led to a massive capacity expansion characterised by investment in infrastructure with long, unproductive lead times.

Apart from personal services, which has seen the fastest capital deepening of any subsector of the economy over the past 25 years (possibly reflecting the fact that repair services, a subsector within personal services, has become increasingly capital intensive and computerised), the rate of growth of capital deepening in the services sector has been consistently lower than in the goods sector since at least the mid-2000s. This is particularly true for the business and industrial services sub-sectors, which have also seen large increases in employment in recent decades.

Figure 2.12 – Components of productivity by subsector between 1994-95 and 2020-21^{a,b}



a. MFP growth at the ANZSIC 1 digit level was aggregated into sectors by weighting the growth in MFP by the gross value added share of that industry (two year weighted average). The capital deepening contribution for each sector was estimated by differencing sector growth in labour productivity from sector growth in MFP. Capital deepening itself was then estimated by dividing the capital deepening contribution by industry by its estimated sector labour income share. Sector labour income shares were estimated by multiplying the factor income shares in the ABS MFP statistics by the total factor income for that industry in the national accounts and then adding up the capital and labour incomes. **b.** Subsectors are — *Goods*: Mining, Manufacturing, Agriculture, forestry and fishing; *Industrial services*: Electricity, gas, water and waste services, Construction; *Distribution services*: Transport, postal and warehousing, Information media and telecommunications, Retail trade, and Wholesale trade; *Business services*: Professional, scientific and technical services, Financial and insurance services, Rental, hiring and real estate services, and Administrative and support services; *Personal services*: Accommodation and food services, Arts and recreation services, and Other services.

Source: Productivity Commission estimates based on ABS (2021, *Estimates of Industry Multifactor Productivity, 2020-21* financial year, Cat. no. 5260.0.55.002).



Finding 2.13

Goods productivity growth is typically faster than services, though with great variation

Productivity growth in the goods sector is faster than in services. However, reflecting their diversity, the variation in growth rates across the services subsectors is substantial.

The large and growing non-market sector could drag on productivity

The large and growing ‘non-market’ sector — including health care, education and public administration²² is characterised by government funded, regulated and often, government operated institutions. The commercial

²² The ABS delineates non-market from market services because extensive government subsidies and funding mean that the prices charged for non-market services do not correspond closely to either the marginal cost or marginal benefit associated with receiving the service.

strictures of the market sector — such as competition and cost reflective pricing — which help drive innovation and productivity growth are effectively missing.

Measured labour productivity growth in this sector has been close to zero since the turn of the millennium (ABS 2021a). While quality may play a bigger role in productivity improvement in certain parts of the non-market sector (especially health care), and such improvements are often poorly measured by statistical agencies (appendix A3), there are several reasons to think that labour productivity is still slower in this sector than for the relatively less heavily regulated market services sectors.

First, the non-market sector drags on productivity in ways not measured by productivity statistics. This drag comes from the fact that as many non-market services are heavily subsidised, their increasing size is likely to require increasing revenue to fund them, which would require increasing taxation and increasing losses of economic activity as a result.²³ Tax reform to reduce the economic burden imposed by taxation could help alleviate this issue, but in the absence of reform, an increasing non-market sector will likely weigh on growth in ways not captured by productivity growth statistics within the sector itself.

Second, while health care has almost certainly benefited greatly from unmeasured quality improvements, many of these have come through improved inputs supplied by other industries. For example, better medications have made health care more effective but pharmaceutical manufacturing is a subset of the goods sector.²⁴ In some respects, the organisation of health care itself has changed very little over time compared with the massive transformations of workplaces in other parts of the economy. Consider the thought experiment given by Rohan Mead in which Florence Nightingale comes back from the grave and is taken to a modern acute hospital.

After an hour's in-service, she is almost ready to clock on for a shift. Florence has identified the nurses' station on the ward, seen her fellow nurses fan out to the familiar pattern of patient beds where they check temperatures (with slightly fancier thermometers), dispense medications and manually update patient records. She rankles at the continuing socially conveyed demarcation between doctors and nurses. A century and a half on from the prime of her nursing days, Florence feels at home. (Mead 2017)

This highlights just how much of the innovation within health care has come from the inputs being supplied to the sector rather than changes in business systems within healthcare.

To understand how quickly the non-market sector will continue to grow and what implications this could have for productivity growth, the Commission developed a simple model of the economy out to the year 2060-61 (the timeframe of the Intergenerational Report) under a number of scenarios. This model is outlined in appendix A.5.

It can be seen that in most scenarios, the non-market sector will likely continue to grow as a share of output and employment (figure 2.13).²⁵ And it is likely that labour productivity growth rates will continue to decline as this sector continues to grow (figure 2.14). Indeed, under these projections the assumed labour productivity growth rate of 1.2% used in budgetary papers will not be attained after 2030 (Commonwealth of Australia

²³ Higher taxes can distort economic activity through a number of channels including reduced incentive to work, invest and innovate. Some of these channels are discussed in Volume 3.

²⁴ If a gross output (as opposed to gross value added) approach to multifactor productivity measurement were possible for the non-market sector, this would be able to adjust for these affects and give a more accurate picture of health care performance.

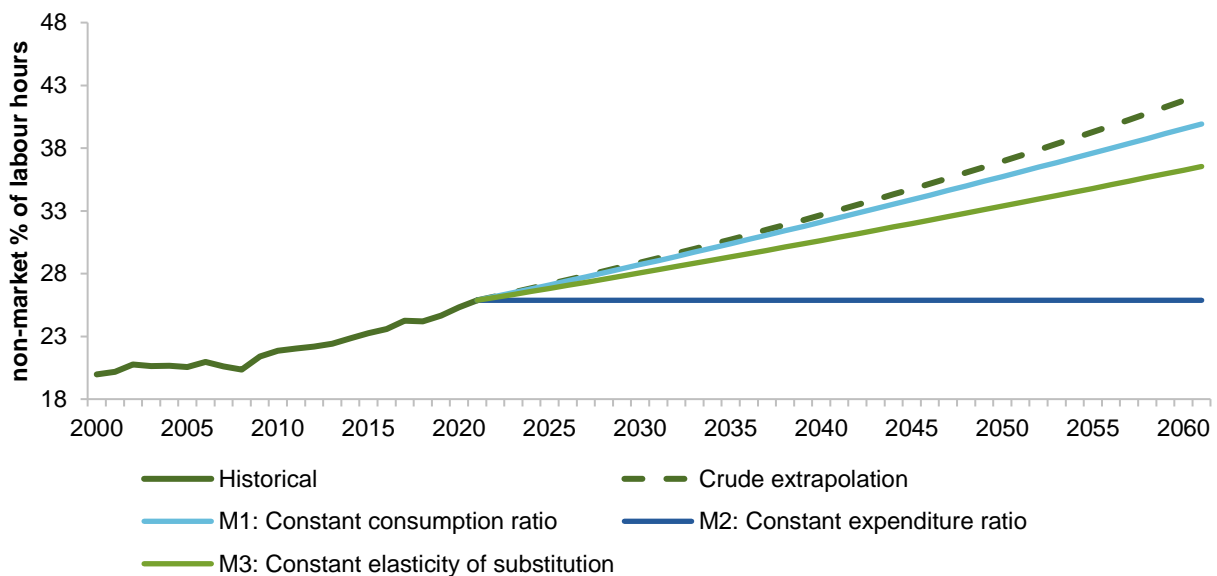
²⁵ In this simple model, the growth in the share of output and employment of the non-market sector are identical.

2022).²⁶ And this is projected to occur under the assumption that market sector productivity continues to improve at a high average rate (1.66%).

The only scenario where the non-market sector did not continue to expand and did not drag down on productivity was where it was assumed that governments and households chose not to spend beyond a fixed proportion of their budget on non-market services. This could occur, for example, if governments decided to cap the proportion of their spending they would allocate to say health or education. However, such a policy would require a reduction in the amount of (per person) services available to Australians, highlighting the difficult trade-offs created by this low productivity growth.

While these forecasts are stylized, they clearly illustrate to policy makers that if the historical rate of productivity growth in the non-market sector does not change (i.e., productivity growth remains close to 0), this sector is likely to continue to grow in size and cost, imposing a significant drag on aggregate productivity growth. The prospects for, and policy settings that would better enable innovation in the non-market sector are discussed in volumes 8 (education) and 5 (non-market innovation).

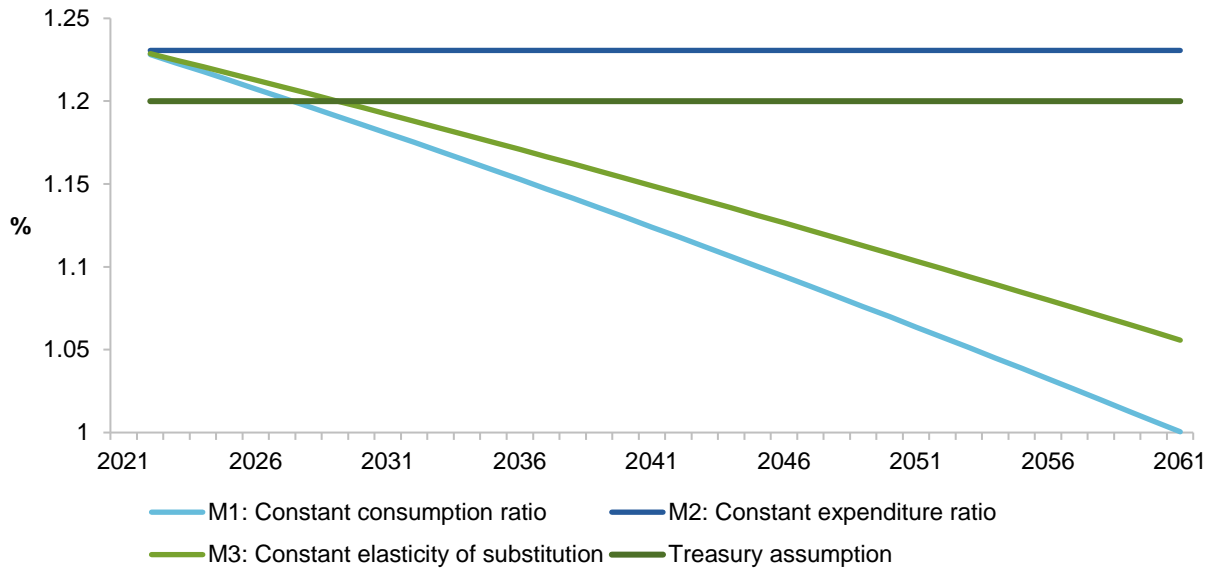
Figure 2.13 – Projected growth of the non-market share
Non-market sector share of the labour force (%) between 2000-01 and 2060-61



Source: Commission modelling (appendix A.5).

²⁶ Only under the assumption that consumers and governments maintain a constant share of their expenditure on non-market services would labour productivity continue to meet or exceed the budget assumptions. However, of the three scenarios, this one is the least realistic (appendix A.5). Indeed, such a scenario could only occur if both private consumers and governments were willing to have real reductions in the amount of non-market services they purchase in order to maintain the same share of expenditure.

Figure 2.14 – The larger non-market sector will likely weigh on productivity growth
Projected whole economy labour productivity growth between 2020-21 and 2060-61



Source: Commission modelling (appendix A.5).

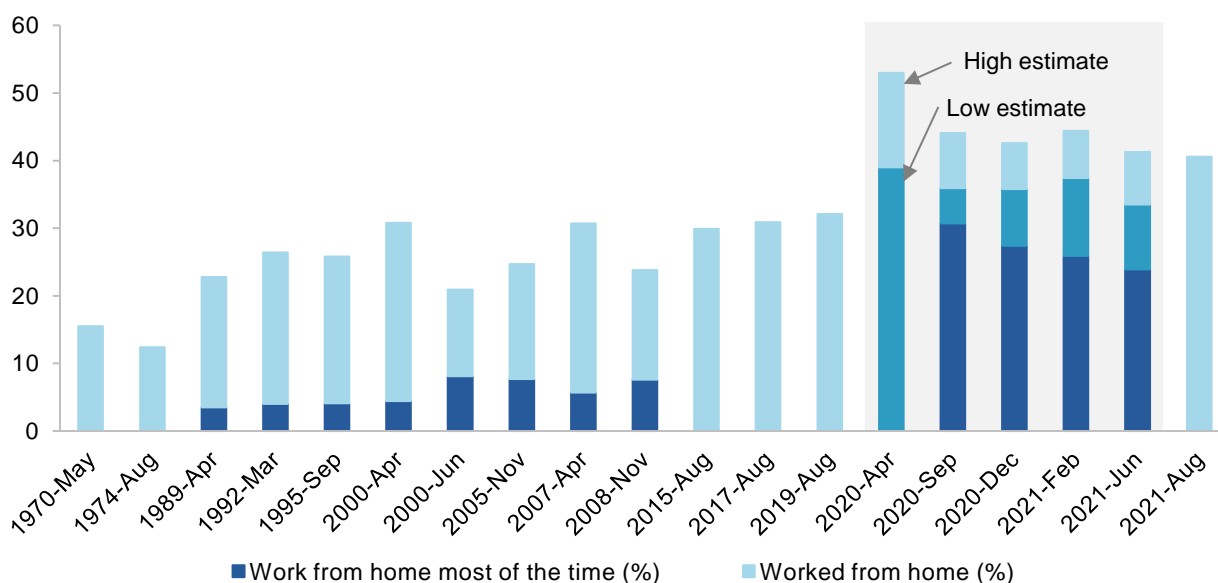
Maintaining momentum in the use of data and digital technologies

A defining characteristic of our COVID-19 times, from March 2020 to the lifting of the last significant restrictions in early 2022, was the hastened adoption of digital technologies to help the economy continue to function. This has been exemplified by governments, businesses and employees alike embracing the move to regular working from home (PC 2021c). The adoption of digital technologies constituted a massive productivity boost, relative to a counterfactual scenario in which such technologies did not exist or were not adopted en masse.

At the height of the outbreak, as many as two out of three people may have been working from home (Baxter and Warren 2021). COVID-19 accelerated the trend of more people working from home, more often. The share of people ‘regularly working from home’ in late 2021 was 40%, about 8 percentage points higher than in 2019, prior to the onset of the pandemic, and about twice what it was a decade prior (figure 2.15). The share of people working ‘most of their hours’ from home was as high as 30% in 2020 (although this has moderated somewhat since then), more than 4 times higher than when it was last measured in 2008.

It is uncertain what proportion of people will continue working from home as the pandemic ends and economic recovery progresses. However, the uplift in online capacity (among both businesses and households) combined with a broader embrace of the innovative potential of digital technology, can transform the way the economy operates — services in particular — with significant productivity benefits. The challenge will be to ensure that policy settings are sufficiently flexible and incentives are appropriately calibrated to support continued uplift as the COVID-19 recovery continues.

Figure 2.15 – COVID-19 accelerated a trend to increasing working from home



Source: ABS (2021c).

Sustaining uptake of online service delivery

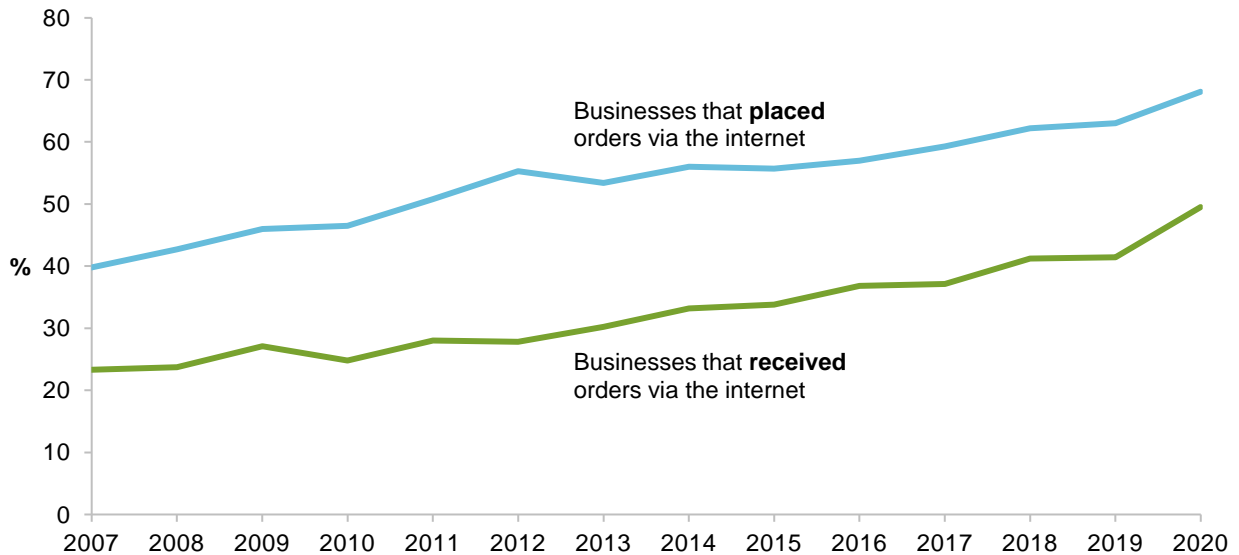
COVID-19 highlighted pre-existing productivity bottlenecks in both the private and public sector, and in some cases underlined how quickly and easily some of these (arbitrary) bottlenecks could be removed by embracing online service delivery. As the Australian economy becomes increasingly dominated by services, embedding these changes into businesses’ and governments’ operations will consolidate longer-term productivity dividends from online activity and services.

Virtual interactions via online platforms provided a crucial substitute to physical face-to-face interactions, which effectively ceased during phases of the pandemic. Across a range of sectors, businesses that had previously only operated from a ‘bricks and mortar’ location invested in online capacity to take orders and payments from customers while also discovering entirely new customer groups, including in overseas markets (figure 2.16). Use of digital documentation and signatures for transactions by legal and financial services that were previously reliant on in-person verification became more widely accepted.

In the government subsidised health care sector, the pandemic highlighted the lack of flexibility in the delivery of some services. The widespread take up of ‘telehealth’ consultations, access to which had been heavily restricted under the Medicare Benefits Schedule funding guidelines prior to March 2020, showed a willingness amongst consumers to engage with telehealth across a variety of services.

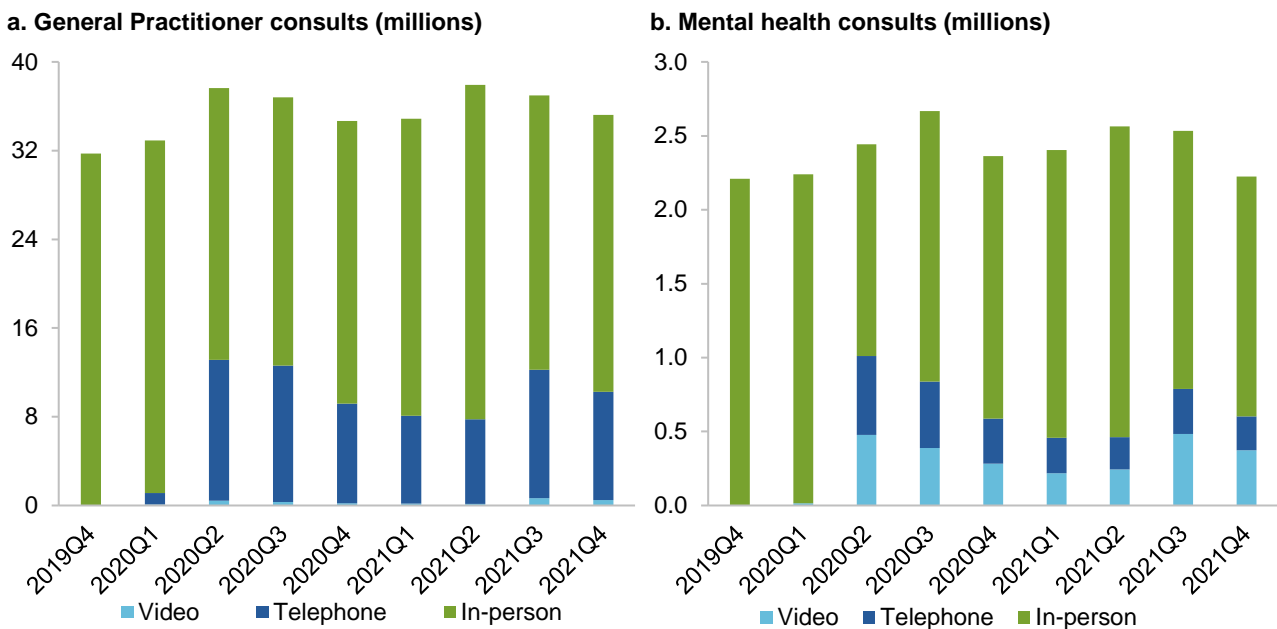
From near zero uptake in late 2019, General Practitioner (GP) telehealth consults jumped to over 12 million in mid-2020 — close to a third of total GP consultations (figure 2.17 panel a) (Snoswell et al. 2022). There was a similarly large impact on mental health consults, including via video conferencing (figure 2.17 panel b). The effect on quality of outcomes for telephone and video consults compared with traditional face-to-face service delivery is, at this point, unclear, although the potential benefits are widely documented (PC 2021a).

Figure 2.16 – Businesses are increasing their digital presence
Proportion of businesses that have placed and received orders on the internet



Source: ABS (*Characteristics of Australian Businesses*, various editions, Cat. no. 8167.0).

Figure 2.17 – Funding changes and lockdowns led to a large jump in the number of telephone and video consultations during COVID-19^a



a. Includes services provided by a GP, clinical psychologist, psychologist, occupational therapist or social worker.

Source: Snoswell et al. (2022).



Finding 2.14

Maintaining the gains in digital technology uptake through COVID

COVID-19 prompted an acceleration in the general uptake of digital technologies and showed that in a crisis, governments, businesses and households can adapt quickly. The challenge is for Australia to achieve a sustained productivity dividend following the pandemic by embedding the efficiency gains from online activity and services.

The nature of innovation is changing in a services-dominated economy

Innovation is about more than just high-tech research and development (R&D) laboratories generating new 'things'. And in an economy increasingly dominated by services, there is another, more immediately practical, side to innovation — the process of changing the way a business operates. The former might require specific, advanced technical skills (such as STEM), but the latter requires a combination of strategic understanding, creativity, drive, risk appetite, emotional intelligence and adaptability. Both forms of innovation are fundamental to productivity growth in a modern economy.

The challenge for Australia is that, historically, innovation in goods-producing industries such as agriculture, mining and manufacturing has usually meant changes to production processes that are far removed from direct consumer interactions. But services sector innovation can be altogether different; for example, by changing a user interface to improve customer experience and service quality.

While scientific breakthroughs feed into such innovations, they are only part of the story. The other part consists of the diffusion, adaption and implementation of such breakthroughs to the needs of consumers and businesses. To achieve this, the exchange of ideas, some scientific, some business and most a hybrid of the two, may be much more important than a focus on the generation and commercialisation of research.

Pivoting the policy thinking on innovation as the economy becomes more dominated by services could be challenging, but the past decade has brought a range of illustrative examples. Vehicle ride sharing apps, online banking and telehealth are all examples of digital technologies being used to disrupt the way consumers access some services. Returning to the Netflix example (box 2.2), online streaming services completely replaced brick and mortar video rental stores. And in doing so, produced a much better product: greater variety that can be accessed from their living room (or anywhere, via their mobile phone), at any time and with no late fees and no waiting (for a DVD to be returned by another customer).

In addition, COVID-19 brought both business adaptation and widespread technology diffusion. Further to the increase in online service delivery discussed above, there were notable examples of businesses rapidly switching the nature of their production during COVID-19, including by changing both business models and business activities simultaneously. Such changes were made to continue using capital equipment, keep workers employed and provide an ongoing income stream. From distilleries that switched to making alcohol-based hand sanitisers, to stage production companies that switched to construction of home office equipment, the adaptability and resilience of private businesses was potently demonstrated.

Despite these past successes, Andrews et al. (2016) noted there is an increasingly large gap between firms at the top and bottom of the productivity distributions, which the authors interpreted as being a defect within the process of diffusing new innovative ideas. And some parts of the services sector face particular headwinds; for instance, while government-funded services — such as health care and aged care — supported the diffusion of technology during COVID-19, their longer-term capacity to adapt their business

models is fundamentally limited by their regulation and funding (volume 5). Finding ways to enable these firms and services to embrace innovations will be important for their future contribution to productivity.



Finding 2.15
Innovation in services may look different

Innovation in services industries is less about inventing 'things' and relies more heavily on diffusing ideas and adapting business models. But this can be difficult for businesses operating away from the productivity frontier, and in sectors where government funding and regulation have a heavy influence.

Data must be used, not just produced

Data has increasingly been used in recent decades to fine-tune and customise production and maintenance processes and enable the creation of new models for business operation (box 2.2). Data use can improve productivity by enabling more competition (as consumers make more informed purchase decisions) and increasing allocative efficiency (as businesses and governments better direct resources to higher-value uses).

Deriving productivity dividends from the increasing data volumes produced in today's economy and society requires individuals, businesses and governments to use data to improve decision making. Effective use of data to improve productivity goes hand-in-hand with widespread adoption of the digital technologies that draw upon and ensure the safe use of data. But while Australia compares well internationally as a data producer and consumer (Chakravorti, Bhalla and Chaturvedi 2019), it performs poorly in its use of data-driven technologies, such as artificial intelligence and data analytics (OECD 2022a, 2022b).

The COVID-19 policy response provided several good examples where data was effectively used to improve health and economic outcomes. There was a great need for consistent quality near-real time data to inform rapid decision making in a range of public services (such as health, public safety and employee financial support) and commercial services (including logistics and supply chain management). The challenge for Australia will be to build on this momentum and accelerate data use in other sectors and contexts, so that we can maximise the value gained from data produced in our increasingly digitised and services-oriented economy.

Volume 4 examines how Australia could get more value out its data holdings and further cash in on the dividend of digital technology.



Finding 2.16
Getting more out of our digital holdings

The large volumes of data produced by our increasingly digitised and services-oriented economy can be used to improve productivity. While there were good examples of effective data use during the COVID-19 response, Australia compares poorly internationally on use of data-driven technologies.

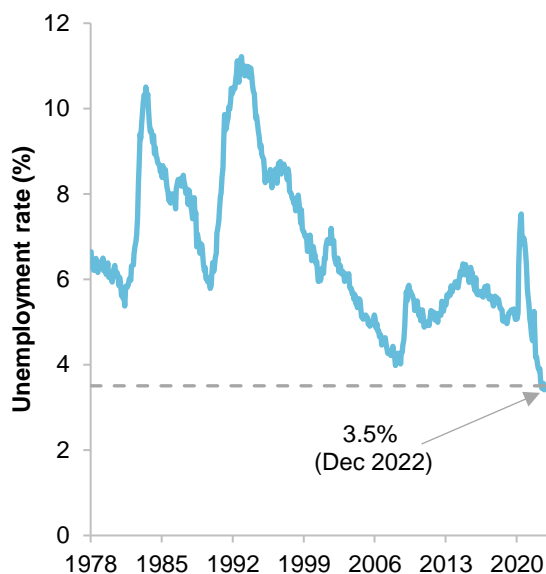
Access to skilled labour

The economic recovery from COVID-19 has been rapid, and this is evident in the current tightness of the labour market. The unemployment rate has reached its lowest level in almost 50 years (panel a figure 2.18) and the relationship between job vacancies and the unemployment rate is at an unprecedented point,

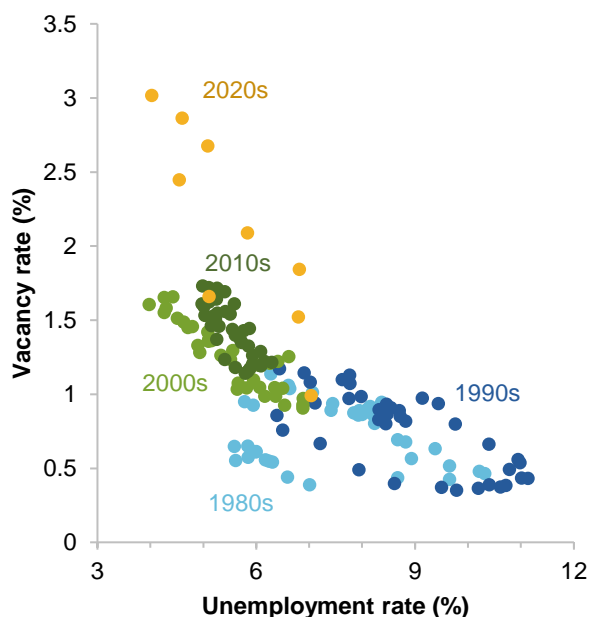
suggesting a very tight labour market (panel b figure 2.18). The fact that the employment to population ratio is also at its highest level in 70 years — more than a percentage point higher than at the start of the COVID-19 pandemic in early 2020 — suggests that the tightness may remain for some time.

Figure 2.18 – The Australian labour market is particularly tight

a. Unemployment rate (seasonally adjusted)



b. The Beveridge curve for Australia



Source: ABS (2022d).

The scarcity of workers can be a spur to productivity improvement, creating strong incentives to invest in new capital and innovate to make better use of labour. In this environment (and with inflationary pressures evident) ensuring labour and other resources flow to their highest value use remains of critical importance.

A highly skilled workforce, proficient in non-routine cognitive tasks is even more valuable in a rapidly changing service economy

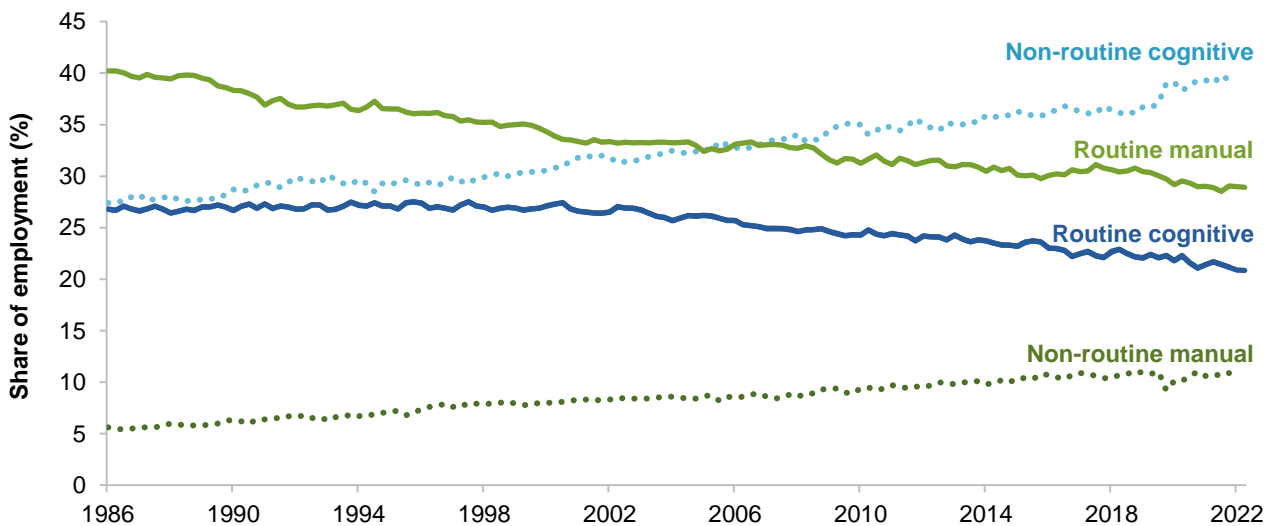
The Australian economy of a few generations ago — where manufacturing and agriculture accounted for nearly half of aggregate production (Butlin, Dixon and Lloyd 2015) — had different skills and educational needs. Those sectors provided relatively high average incomes with a workforce that was largely trained on the job, with fewer requirements for formal education. As services (including high tech and human services) continue to expand as a share of economic activity (and goods production increasingly requires highly skilled labour), jobs in the Australian economy increasingly involve non-routine tasks (figure 2.19). The diffusion of technology has supported these trends. AlphaBeta (2017, p. 13) estimated that about 70% of the ‘automation’ expected over the next 15 years will involve automating tasks within jobs (rather than replacing entire jobs). The capacity of professionals and other vocations to perform tasks will be enhanced by in-time delivery of analytical insights and information.

While these non-routine services jobs often require more formal education in the first instance, the evolving nature of the modern economy also means that the workforce needs to be able to easily upskill and reskill as job roles change including because of the introduction of new technologies. Meeting this challenge requires academic and vocational education systems that can provide the workforce with both solid foundational skills — such as the ability to problem solve and to think critically — as well as equipping workers with the specialist (or vocational) knowledge required for specific roles.

Volume 8 discusses the importance of quality education and training systems for providing skills and adaptability of the workforce.

Figure 2.19 – Non-routine roles are on the rise

Job types in the labour force (share of total)^a



a. Based on a mapping from ABS labour force to Australian and New Zealand Standard Classification of Occupations job classifications. Non-routine, cognitive: Managers, Professionals; Non-routine, manual: Community and Personal Service Workers; Routine, cognitive: Clerical and Administrative Workers, Sales Workers; Routine, manual: Technicians and Trades Workers, Machine Operators and Drivers, Labourers.

Source: ABS (2022d, table 7); Leal, Lai and Rosewall (2019).



Finding 2.17

The future workforce will involve a different set of skills

A high skilled workforce is more important in an economy where jobs increasingly involve non-routine tasks, and use of digital technologies and data manipulation.

Skilled overseas workers can support productivity

The Australian border has now reopened to migration after being closed for almost two years, which could help satisfy the current unmet demand in the domestic labour market. However, tightness in the labour market is not unique to Australia. Labour markets in most advanced economies are at, or above, full employment. This suggests that Australia may face greater competition in attracting skilled labour post COVID-19.

Migration has long been a defining characteristic of Australian cultural and economic life. The benefits of migration in a productivity context are numerous.

- Migration complements the education sector to supply skills to the Australian labour market. This allows Australian firms to become more productive, by hiring the best available workers, but also increases competition amongst employees, which can provide incentives for workers to improve their skills.

- Migration can help to provide a diversity of skills and facilitate the diffusion of innovation, particularly where foreign work experience helps Australian firms adopt global best practices, or where foreign workers may be necessary to implement technology that is new to Australia.
- Migration can also play a role in filling skill gaps in occupations with standardised (competency-based) licensing, or in regional areas that rely on either international or interstate migrants.

At the same time, migration can have unintended effects on productivity. Some businesses may face reduced incentives to provide on-the-job training, while others may only seek migrant workers who will accept lower wages (rather than improve the quality of output). And unexpectedly rapid population growth that is concentrated in particular areas can create congestion in the provision of some services, as well as pressure on infrastructure. Immigration should not be seen as the solution to every case where an employer cannot find an employee at the prevailing wage.

Attracting the best and brightest migrants may be more difficult post COVID-19. Global migration patterns have not returned to those observed prior to the pandemic and it is not guaranteed that Australia will remain as attractive to working migrants as it was previously (CEDA 2015). Recent evidence suggests that enrolment levels for international students in Australian universities (previously a source of considerable low skilled labour in the food services and hospitality sectors) may remain subdued in the near term (DESE 2022).

The number of skilled employees who are working overseas while undertaking tasks online for businesses based in Australia may have increased during COVID-19 in line with the increased uptake of working from home. In the short term, this is an avenue to alleviate some existing labour market pressures, and in the longer term — if its use by employers increases — it could lower the reliance on the formal skilled migration system and have potentially significant implications for the way in which businesses access skilled labour.

Australia's migration settings, and how they could be improved, are discussed in chapter 2 volume 7.



Finding 2.18

Tight labour markets mean that efficient allocation of labour is more important than ever

Tight labour market conditions in Australia strengthens the need for workers to be allocated to their highest valued use. It also highlights the importance of access to skilled labour from other countries, which can help alleviate demand pressures and enhance productivity by improving the quality and diversity of skills in the labour market.

The challenges of climate change and decarbonising the economy

Climate change and the associated need for decarbonisation of the Australian economy could dampen future productivity growth, particularly if the transition is not appropriately managed.

Climate change itself poses a threat to the Australian economy through various channels, and by some measures this threat may be larger than for other major economies (figure 2.20). These risks are most pronounced for industries that depend directly upon the natural environment as a key input, such as agriculture, tourism and construction. The ways in which these industries adapt to the effects of climate change will influence their potential for productivity growth — a challenge compounded by the continued effects of past carbon emissions.

The need to decarbonise the economy over a relatively short timeframe has implications for productivity. On the one hand, it reduces a production cost (carbon emissions) but could also reduce measured productivity growth due to:

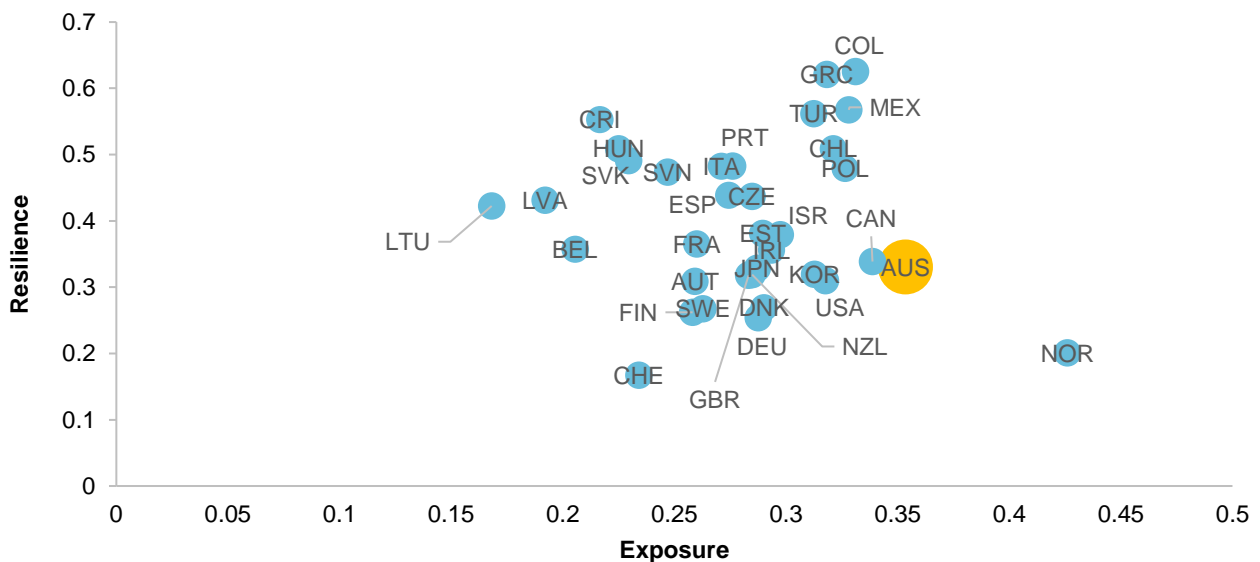
- the costs associated with developing and implementing new technologies to achieve decarbonisation (for example, replacing fossil fuel-based energy generation with alternative sources — effectively investment to replace, rather than increase, the economy's existing capital stock)
- the move away from some existing low-cost production methods (for example, switching away from using coal to produce steel)
- reducing production of goods that do not have carbon-free production methods (for example, if no carbon-free fuel sources are found for commercial flights).

These costs need to be balanced against the benefits of decarbonising the economy in line with Australia's commitment to net zero emissions by 2050. The policy challenge is to ensure that the process of decarbonisation is undertaken in the most cost-effective way.

This task is made more difficult by the considerable uncertainty about the cost of reducing emissions (or failing to reduce emissions enough), the desirable pace of decarbonisation and the lowest cost method of achieving it. Technologies and methods of decarbonisation will need to be developed and selected in an environment where full knowledge of the associated costs and benefits will only be apparent in the future.

Volume 6 discusses how Australia could achieve net-zero carbon emissions at least cost.

Figure 2.20 – Australia's comparative preparedness for a low-carbon transition^a
Economic exposure and resilience to transitional risk in Australia and OECD countries



a. OECD country abbreviations are: Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Chile (CHL), Colombia (COL), Czech Republic (CZE), Denmark (DNK), Estonia (EST), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Hungary (HUN), Iceland (ISL), Ireland (IRL), Israel (ISR), Italy (ITA), Japan (JPN), Korea (KOR), Latvia (LVA), Lithuania (LTU), Luxembourg (LUX), Mexico (MEX), Netherlands (NLD), New Zealand (NZL), Norway (NOR), Poland (POL), Portugal (PRT), Slovak Republic (SVK), Slovenia (SVN), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey (TUR), United Kingdom (GBR) and United States (USA).

Source: Peszko et al. (2020).



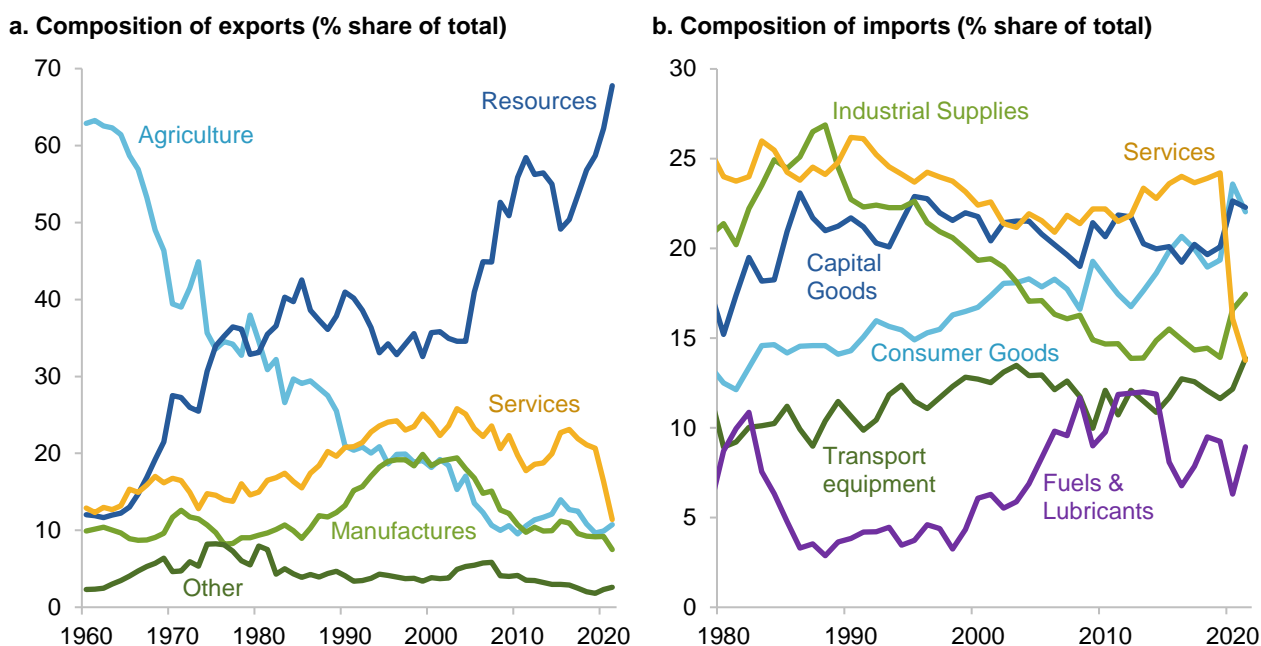
Finding 2.19
Climate change is a productivity challenge

Climate change presents risks to the Australian economy, especially for industries that utilise the environment as a key input. Selecting forms of abatement and mitigation to cost effectively achieve Australia’s net zero by 2050 commitment will be challenging given the inherent uncertainty about future technological breakthroughs.

Vulnerability to international headwinds

As a small economy, Australian businesses and consumers are heavily reliant on, and have benefited enormously in the past from, foreign investment and trade. Much of our agricultural production (beef, wool, wheat, forestry and fishery products) and resource and energy outputs (such as iron ore and coal) have been sold on global markets. Many of our consumer goods (from televisions to toasters to smartphones to overseas holidays and clothing and footwear) and production inputs (including those in the form of the latest technologies embodied in capital) have been brought in from overseas (figure 2.21).

Figure 2.21 – Australia is heavily reliant on resource exports, but imports are balanced across a range of consumer and business goods and services



Source: RBA based on ABS (2022b, tables 1, 5, 6 and 10).

Historically, Australia’s domestic savings have been insufficient to fund the numerous investment opportunities available, and we have typically run a current account deficit. For this reason, Australia has relied on foreign investment to fund infrastructure and other capital, which has allowed the economy to grow faster than our relatively small pool of domestic savings would otherwise have allowed. Even to the extent Australia can meet

its overall capital needs²⁷ using domestic savings, foreign investment is still desirable because it brings new expertise, innovations and novel types of capital to Australian firms. Investment, domestic and foreign, will continue to be critical enablers of growth in Australian living standards into the future.

Recent global developments could add to the productivity growth challenge. The reappraisal of supply chain risks could see firms incur costs to achieve greater certainty. Global tensions have disrupted trade flows, added complexity to foreign investment policy and led to a degree of technological decoupling. All these effects could add costs and impede productivity growth to some extent. They could be compounded by policy responses that further move away from openness and multilateralism. Australia has not always been as open as it is today. Following Federation, the newly created Australian Government embraced protectionist policies: erecting tariffs, protecting manufacturing, centralising wage arbitration and adopting the White Australia policy. The latter two had the effect of reducing labour market flexibility and the size of the potential pool of foreign labour that could be accessed, while tariffs had the effect of 'taxing' both domestic consumers and other Australian exporters²⁸ while also reducing the incentives for productivity improvement in trade exposed- industries.²⁹

For a while, any negative effect of 'Fortress Australia' on living standards was not obvious in the aggregate statistics. Strong global demand for Australian resources meant that prosperity could be found via a 'ride on the sheep's back'. But from the 1950s onward, Australia's productivity performance consistently lagged the OECD, and Australian living standards began to fall relative to our peers: in 1950 Australia was ranked 5th in the world in terms of GDP per person, but it was 9th by 1973 and 15th by the late-1980s (Banks 2005). Such movements in relative rank reflect both domestic policies — several studies have argued that the fast productivity growth experienced by Australia in the 1990s can be linked with the preceding microeconomic reforms (including significant trade liberalisation) (Parham 2004; PC 1999) — as well as a host of factors unrelated to domestic policy (not least of which is catch up from a number of other economies).

'Fortress Australia' was born of a time of increased global instability and deep scepticism of reliance on international trade and capital flows for economic development. It highlights the economic (and cultural) costs of turning inwards, still relevant in a world where external threats — threats to national and cyber security, critical supply chains to name a few — seem abundant. Chief among these costs is that it can create powerful, often mutually reinforcing, avenues for rent seeking that are difficult to unwind once created.³⁰

This policy episode has clear parallels with the contemporary international trade environment. Disadvantage in areas affected by trade liberalisation, increasing political tensions between major global powers and a series of supply-side disruptions resulting from the COVID-19 pandemic appear to have cooled enthusiasm for multilateralism. The challenge for Australia moving forward will be to maintain the stance of unilateral free

²⁷ Australia has run a current account surplus since September 2019 — the first surplus since 1975 — on the back of an elevated terms of trade.

²⁸ Tariffs have the effect of decreasing demand for foreign imports, which reduces the demand for foreign exchange and appreciates the domestic currency. This makes Australian exports less competitive, effectively placing a 'tax' on them (Dornbusch 1974; Furceri et al. 2018).

²⁹ Trade openness improves productivity growth through a number of channels: i) increased competition leading to resource allocation away from unproductive firms and towards productive ones; ii) increased market size for exporting firms raises the return on both developing and adopting new innovation; and iii) increased economic integration creates more opportunities for knowledge flows, leading to faster diffusion of innovation (Acemoglu and Linn 2004; Crespi, Criscuolo and Haskel 2008; Melitz and Trefler 2012).

³⁰ For example, early in the Fortress Australia period, there were instances where an industrial court (one of the key components in centralised wage arbitration) would increase minimum wage requirements for import-competing firms, who would then lobby for governments to increase tariffs to preserve their profitability. However, higher protectionism itself was then often used as an argument to increase minimum wages by industrial courts, leading to a spiral of ever greater protectionism (Wilson 2014).

trade that has been demonstrated as the best policy response even when other countries increase their trade barriers (PC 2017a, p. 79).

Chapter 3 volume 3 discusses how Australia trade and foreign investment policy should evolve in light of increased global tensions.



Finding 2.20

The opportunities of a service-based economy

As an increasingly services-based economy, Australia can benefit from greater global trade and integration in many service industries.

Appendix

A. Productivity and how it is measured

A.1 What is productivity?

Recall the definition of productivity given at the start of section 1.2 in chapter 1:



This raises the question: what should be treated as inputs and what should be treated as outputs? How this question is answered creates different methods of measuring productivity. The most commonly reported measures of productivity are 'labour productivity' (the ratio of output to the number of work hours used in production) and 'multifactor productivity' (the ratio of output to a combination of both hours worked and capital). The difference between the two is the definition of 'inputs'. Output always refers to the production of goods and services minus the value of goods and services purchased from other firms, or 'gross value added'. At the whole economy level, 'output' is gross domestic product (GDP). Box A.1 contains a stylised example of labour productivity.

Box A.1 – Jared and the chocolate factory: a stylised example of labour productivity

Jared works in a chocolate factory. Jared's boss, Colin, wants to measure the labour productivity of his workforce to make operational improvements at the factory. Colin estimates that during a 40 hour work week, Jared produces 2000 chocolate bars. Colin calculates Jared's labour productivity as:



While this allows Jared's performance to be compared with other employees in the chocolate bar branch, Colin cannot compare Jared to employees in the chocolate biscuit division. To allow for comparison, Colin notes that chocolate bars each sell for \$2 and Jared produces 2000 of them, so the total value of

Box A.1 – Jared and the chocolate factory: a stylised example of labour productivity

Jared’s production is \$4000. Using this instead of just the number of chocolate bars, Colin calculates Jared’s labour productivity as:



In this report we are interested in the enablers of productivity growth, which cover a broad range of actions by firms and individuals, as well as policy and institutional settings. For statistical purposes, we often divide productivity growth into two (slightly stylised) categories: capital deepening and multifactor productivity (MFP).

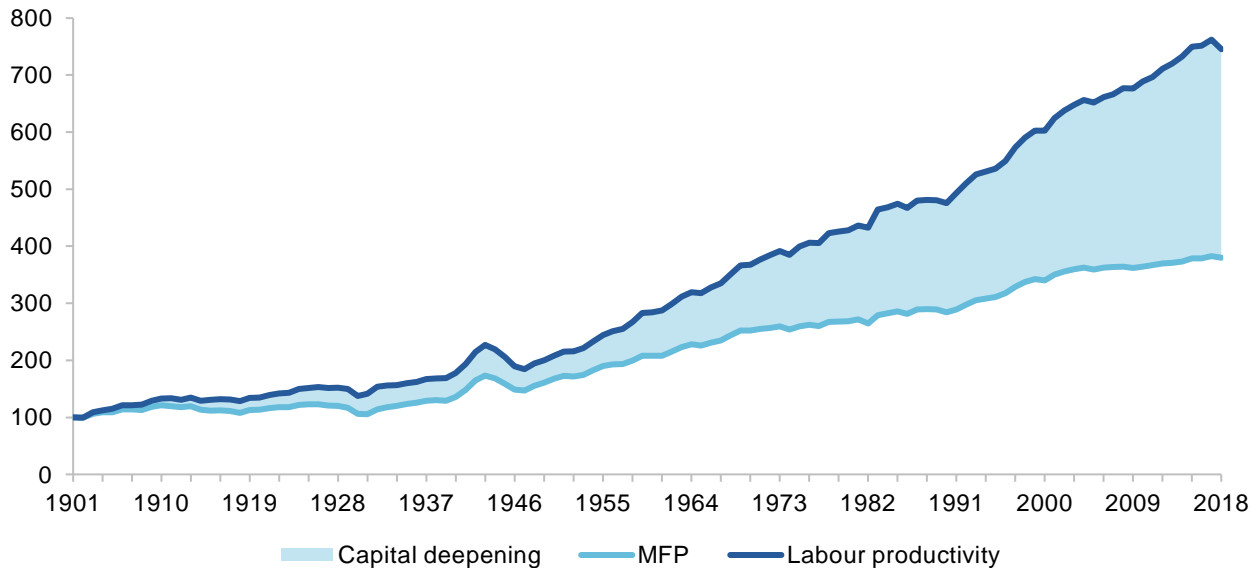
- Capital deepening is the process of investing to increase the stock of buildings, machines and intellectual property relative to labour. Capital deepening accounts for about 45% of labour productivity growth since 1901 (figure A.1).³¹
- Multifactor productivity describes how productively firms combine both capital and labour and accounts for about 55% of labour productivity growth since 1901.

The distinction between these two sources of growth is clearer when considered from the perspective of a company and the business manager. A business manager has a choice in how much ‘capital’ (machinery, equipment and buildings) to allocate to each employee. For example, the manager of a retail store must decide how many automated checkouts to install for each checkout employee. As the number of automated checkouts increases, each employee is more productive (the number of customers served, and the value of output generated per day, rises) as they no longer have to scan and bag grocery items, but can instead concentrate on troubleshooting when the automated checkouts make mistakes. So, each additional automated checkout machine raises the labour productivity of each existing checkout worker.

This process of increasing the ratio of capital (in this case automatic checkout machines) to labour (checkout staff) is called ‘capital deepening’. Eventually, as the number of machines per employee increases beyond a certain point, the additional profit created by each machine will fall. This could be because staff cannot, in a timely manner, supervise an ever increasing number of machines when mistakes occur, giving rise to ‘diminishing returns’.

³¹ Based on estimates of labour productivity, GDP per capita and MFP in the *Long-Term Productivity Database*. Note that this dataset uses capital services that impose a constant (exogenous) rate of return on different kinds of capital, which differs from capital services measures used by modern statistical agencies.

Figure A.1 – Australian labour productivity growth due to capital deepening and MFP^a
Index (1901=100)



a. Capital deepening is the difference between growth in labour productivity and growth in MFP.

Source: Bergeaud, Cette and Lecat (2017).

If the retail manager rearranged the machines, or perhaps added signals that quickly alerted staff about malfunctioning machines, this would make the staff *and* the machines more productive. This is an example of an MFP improvement. Once this is done, it then becomes profitable to add even more automatic checkout machines per staff member. That is, as the MFP of the store increases, the more profitable capital deepening becomes.

In many ways, the distinction between capital deepening and MFP is stylistic — a simplification of a highly complex real world process. It is but one lens through which to view the path of productivity growth. But it can shed some light on sources of past productivity growth in the Australian economy.

MFP growth can come from a number of sources, including the introduction of new technology in the production process, and redesigns of the systems of production (for example, changing the physical orientation of factories or the structure of supply chains). If there is an increase in MFP, then this means the profitability of *new* capital (machines, equipment etc) increases and so businesses invest more, leading to an increase in the amount of capital per employee in the economy (the capital to labour ratio). In this way, an increase in MFP encourages more capital deepening, making MFP growth a necessary condition for continued labour productivity growth as it pushes out the point of diminishing returns on new capital.

The various measures of productivity are summarised in box A.2.

Box A.2 – How do we measure productivity?

What do all measures have in common?

There are many ways to measure productivity, but they all compare the ratio of output produced by firms to the inputs used. Where they differ is in the particular inputs and outputs that are examined and whether market prices or other methods are used to weight particular products and inputs.

Labour productivity and quality adjusted labour productivity

Labour productivity is a commonly produced, intuitive measure of productivity. It is the ratio of output (usually measured as gross value added derived in respective countries' system of national accounts) to the number of hours worked (labour) to produce this output. A complementary capital productivity measure is more difficult to produce, because capital services data is often harder to collect (and harder to compare across time and across countries). Labour productivity is often used for cross-country and cross-industry comparison, and is more easily available than multifactor productivity measures.

In addition to calculating labour productivity using labour hours, some statistical agencies also calculate quality adjusted labour hours by weighting the growth in labour hours in different occupation-skill combinations by their different wages. This has the effect of giving higher weight to growth in hours worked in occupation-skill combinations that demand higher wages.

Multifactor productivity

Multifactor productivity (MFP) measures the ratio of output to a combination of labour and capital services. Generally, MFP is calculated as a growth rate and the growth in combined inputs is the weighted average of labour hours and capital services growth with the labour and capital shares of income being used as the weights respectively.

Capital services are typically calculated as a weighted average of growth in different capital assets with different asset types in different industries given different weights based on market profits, depreciation rates and several other factors. Because these weights are different for different countries in different years, it makes levels comparisons of MFP across countries (or industries) difficult.

KLEMS productivity

When calculating labour productivity or multifactor productivity, the measure of 'output' is typically the value of goods and services produced by a firm ('gross output') minus the goods and services they bought from other firms ('intermediate inputs'), which is referred to as 'gross value added'. An alternative is to use gross output as the measure of output and add intermediate inputs as an additional input along with capital and labour. KLEMS productivity measures take this a step further and split out the intermediate inputs into services, materials and energy. The advantage of this approach is that it gives insight into how a particular industry uses the energy, materials and services of other firms to produce its output. A major disadvantage is that KLEMS analysis only makes sense at an industry or firm level because at the whole economy level there are no 'intermediate' inputs only capital and labour.

Non-index methods

The above measures of productivity are referred to as 'index methods' and are the approaches used by national accounts agencies. While these methods are well suited to the measurement of aggregate progress, they have the shortcoming that they require market prices to weight different goods and services. Certain 'non-market' services such as public services, health care and education are often

Box A.2 – How do we measure productivity?

provided at free or discounted cost due to extensive government subsidies and so using national accounts methods is not appropriate.

For these services, economists often use alternative methods to measure productivity such as Data Envelopment Analysis, Stochastic Frontier Analysis and several others. These methods compare productivity of firms by focusing on a narrowly defined industry and rather than using prices and cost shares to weight different outputs and inputs, they make assumptions about the way different inputs and outputs can be combined by firms (as well as about how random noise and productivity improvements can be separately identified). For example, an economist might create a stochastic frontier model by assuming firms have constant returns to scale and use a Cobb-Douglas production function with the relative efficiency of firms being half-normally distributed. These assumptions may be strong but they remove the need to have market prices to compare firms within narrowly defined industries.

Source: Sickles and Zelenyuk (2019).

A.2 The elusive quest for the causes of growth

The past 70 years have seen the development of numerous ‘growth’ models that attempt to explain the underlying drivers of economic growth (and hence, productivity) at the aggregate level.

The task has several challenges. First, it is an attempt to explain what (many) economists regard as an ‘unexplained residual’ — that is, the observed tendency for output to grow by more than can be accounted for by the growth in capital and labour inputs. Second, it is an attempt to sum up in a single variable (or very few) the underlying cause or driver of growth, whereas in reality growth comes from multiple, disparate, uneven processes.

Candidate variables have included capital accumulation, an externally determined rate of technological advance, improvements in human capital, and the generation and sharing of ideas that add cumulatively to the stock of knowledge across the economy.

While such models have been used to explain some of the massive divergence in economic growth experienced across countries and time, none of them completely succeeds in predicting or, even ex-post explaining, the rates of growth of most countries. And in most cases they are of limited use as a guide for comparing specific policies. In particular, they are not a substitute for rigorous project evaluation and cost benefit analysis of government programs. But the aspects of economic growth they do manage to explain and — often more importantly — the aspects they *do not* manage to explain reveal much about both the nature of economic growth itself and the strengths and limits of formal models in identifying the underlying drivers of the growth process.

There are some key takeaways from these models.

- Once a country achieves high income status, all further economic growth will tend to be driven by a ‘residual’ term — multifactor productivity — which includes the effects of innovation (technological progress) and better resource allocation (Aghion and Howitt 1998, p. 16, 2009, p. 39). However, explaining the *source* of innovation was the main gap in older economic models.

- The MFP residual is partially due to the steady acquisition of skills and experience by the workforce. Known as ‘human capital’, this also captures the direct effect of formal education (Lucas 1993; Mankiw, Romer and Weil 1992).
- Some early models emphasized the role of a common stock of scientific knowledge, produced through public funding of research, as underpinning, or enabling, private innovation (Arrow 1962a; Nelson 1959).
- Other models of growth emphasise the role of ideas more broadly in explaining residual MFP growth. Because one’s use of an idea does not prevent others from also using it (ideas are ‘non-rivalrous’) the stock of ideas can grow exponentially (Arrow 1962b; Romer 1986). Some of these ideas are generated via a process of ‘learning by doing’ and are often embedded in new capital (Arrow 1962b), but markets may undervalue the provision of this learning and so less is achieved than socially desirable.
- More recent growth models emphasise the process by which knowledge is shared across an economy, highlighting that the transfer of knowledge is not an automatic process (Lucas 1993).
- Another class of models emphasise ‘creative destruction’, an ongoing process characterised by new innovations leading to the replacement of older products and production techniques (Aghion and Howitt 1992). These models implicitly embrace the unevenness and unpredictability of productivity growth, highlighted in chapter 1 as a central driver of MFP growth, and as an explanatory factor for differences in income levels between economies. There are various explanations for how creative destruction occurs and its nature.
 - Markets provide price signals about the value of innovation and the design of market structures can moderate the strength of this signal (Aghion and Howitt 1998, pp. 205–225).
 - Education plays an indirect role in lowering the cost of undertaking or engaging with innovation (better educated workers can more easily adopt and improve on new scientific concepts in an applied setting) (Aghion and Howitt 1998, pp. 327–356).
 - The closer an economy comes to the technological ‘frontier’, innovation efforts should focus less on ‘catching up’ and more on novel breakthroughs to drive continued growth (Aghion and Howitt 1998, pp. 67–69).
- Some newer models also emphasise the role of general purpose technologies (GPTs, such as steam power or electricity) to drive rapid, prolonged periods of productivity growth (Bresnahan 2010; Bresnahan and Trajtenberg 1995; Brynjolfsson, Rock and Syverson 2018).
 - The information and communications technology (ICT) revolution was the most recent example of a GPT. Some suggest that newer digital technologies (such as artificial intelligence) will be the next GPT (Brynjolfsson, Rock and Syverson 2017).
- Institutional settings that underpin markets are an important ingredient that influence the pace of economic and productivity growth by encouraging and rewarding risk-taking and providing a test bed for ideas via price signals and the free flow of resources across the economy (North, Wallia and Weingast 2006).

Some papers even question whether productivity growth is even exponential. For example, Philippon (2022) has found that a linear model of multifactor productivity appears to fit the data better than a geometric model, implying that slowing multifactor productivity growth is not a bug so much as a feature of the economic system itself. This might be the case, for example, due to the accumulation of ideas itself inherently following an additive, rather than multiplicative, process.

A.3 Changing prices make productivity measurement challenging

Measurement of real productivity (and GDP) growth is complicated by changing prices. More straightforward is the measurement of nominal productivity growth, which only requires adding up the total dollar value of goods and services produced in the economy and dividing by some measure of inputs (usually number of hours worked).

Constantly changing prices creates problems for productivity measurement because prices are used to weight the importance, or value, given to a particular good or service. If a product has a high price, then it receives a high weight under the assumption that this product is valued highly by consumers. But what if a product has a high price in one year and a low one in the next? Which set of prices should be used? The first or the second year's prices?

A simple solution is to use the prices from the first year to weight goods produced in the first year and prices from the second year to weight goods produced in the second year. But this approach has two issues. First, it ignores 'inflation', the general increase in the price level of goods and services. To see why this is a problem, imagine all goods and services uniformly increased in price by 2% between the first and second year. If the prices for the first year are used to weight goods in the first year and prices in the second for products in the second year, then this will lead to productivity measures also increasing by 2% even if actual production remained unchanged. This is because all of the prices will increase by 2% even if the quantity does not. The second issue is that this approach does not deal with the issue of products that are lacking prices either in the first period (because the product was invented in the second period) or in the second period (because the product became obsolete in the second period after being replaced by a new product).

The various measurement challenges for productivity created by changing prices can be grouped into a few distinct types:

- *substitution bias* — when the price of a good changes, should we use the old price or the new price? As discussed below, the answer turns out to be somewhere in the middle
- *outlet bias* — the emergence of discount outlets creates issues as to which price (the common retail price or the discount price) should be used to weight a particular good
- *quality and new product bias* — new products or products whose quality has improved have the challenge of not having past prices. Likewise, products that are no longer sold had prices in the past but no longer have them.

Each of these challenges and their consequences (and potential solutions) for productivity measurement will be discussed below.

Substitution and outlet bias

Substitution bias is the potential to over or underestimate inflation (and hence productivity) because of changing relative prices. To understand substitution bias, consider a simple example involving apples and oranges: both apples and oranges were \$2 last year but now apples have risen in price (perhaps because of a flood) to \$4 while oranges are still \$2. If we use the first year's prices in both years, this will tend to underweight apple production in the second period and if we use the second year's prices, this will tend to overweight apple production in the first year. In either case, productivity and inflation will be mismeasured.

A good way to solve this issue is to take the geometric average of the two prices.³² Such a measure of prices is called ‘superlative’, meaning it is symmetrical between prices of the two periods (Hausman 2003, pp. 33–35). Another approach to mitigate substitution bias is to have more frequent collection of data on prices and quantities.

Outlet bias refers to the potential bias caused by the existence of discount outlets that offer almost identical products at lower prices. Unlike substitution bias, this issue cannot be resolved using a different formula to calculate the weights given to particular goods. Instead, more frequent and detailed collection of price and quantity data for both outlet and non-outlet stores is necessary (Hausman 2003, pp. 32–33).

Quality improvements and new products

The consumer benefits of both quality improvements and new products were discussed previously (chapter 1). The reason these two kinds of improvement are often underestimated in productivity statistics is that both require statistical agencies to know the size of the consumer welfare gain (or ‘consumer surplus’) due to either the quality improvement or the introduction of a new product/variety. However, these welfare gains cannot be inferred from the changes in prices alone, information is needed about how much consumers would have been willing to pay for either the quality improvement or the new product (which is typically *more than* the current market price) (Hausman 2003, pp. 25–32).

Box A.3 gives an example of the issues created by the introduction of new products.

Box A.3 – Why do new products present problems to GDP measurement?

Quality improvements and the introduction of new products present no problems to the measurement of *nominal* output and productivity but can distort measures of *real* (inflation adjusted) output. In order to understand how, consider how chain-weighted GDP growth (the most common method) of GDP is calculated:

$$\text{real GDP growth} = \frac{\sum p_j^0 q_j^1}{\sum p_j^0 q_j^0} * 100 - 100$$

Where p are prices of a product, q are the quantities of products, j is the subscript for a particular product and superscript 0 and 1 refer to periods 0 (yesterday) and 1 (today).

In order to calculate the growth in production between two periods of time, the price of all j products needs to be known for the first period. But for goods that did not exist in the previous period either because they are new products that were introduced in the current period or because their quality changed enough that the prices at their previous levels of quality are not appropriate, this creates the problem of what price to apply.

A case where a whole new product is introduced is shown in the table below. Here only apples and widgets were ever produced, with widgets being invented in the second period and not existing in the first period. This means there is no market price for widgets for period zero and so it is unclear how to calculate real GDP. Improvements in quality that are not incorporated in prices create similar issues.

³² The approach of using the first year’s prices as weights is called a ‘Laspeyres’ index while using the second year’s prices is called a ‘Paasche’ index while using the geometric average of the two is called a ‘Fisher’ index.

Box A.3 – Why do new products present problems to GDP measurement?**Example of introduction of new products**

	Widgets		Apples		Nominal GDP
	Price (\$)	Quantity	Price (\$)	Quantity	
Period 0	?	0	1	10	10
Period 1	2	2	1	5	9
Growth	-	-	-	-	-10%

Looking at nominal GDP growth, it would look like GDP *fell* but how do we know if this is also true of real GDP? One approach, is to determine what the price of widgets would need to have been in period 0 in order for the quantity consumed to be zero. Under this approach, say we determined that based on observed demand this price would have to be \$10 per widget. In this case, we can calculate real GDP as:

$$real\ GDP\ growth = (10 * 2 + 1 * 5) / (10 * 0 + 1 * 10) * 100 - 100 = 150\%$$

So once the price of the new good is properly accounted for, real GDP actually increased substantially due to the introduction of the new product.

What is the net effect of these price-related measurement challenges on wages growth?

Beginning with the Boskin Commission, a range of papers and public inquiries have examined the effect of various measurement issues on estimates of consumer prices (table A.2). With the exception of substitution bias, most of these issues in the measurement of consumer prices pass onto issues in the measurement of productivity (box A.4); however, all of the studies considered here are for estimates in the United States (US) economy. It is unlikely that Australian estimates differ significantly for consumer prices but they may with respect to productivity (consumer product sales tend to be more similar across advanced economies than production patterns due to international trade of consumer goods). The only Australian estimate of consumer price index bias that can be directly compared with the United States estimates are those of ‘upper level’ substitution bias. According to the ABS, this was about 0.22 percentage points annually between 1995-96 and 2015-16, which is broadly similar to the range of 0.15-0.3 percentage points estimated for the US (ABS 2017; Moulton 2018, p. 31).³³

Assuming estimates of the bias in the consumer price index for the US due to quality improvements and the introduction of new products are applicable to Australia (say at the lower end of the range, about 0.37 percentage points per year), then this implies that Australian wage growth over the past twenty years (June 2001 to June 2021) was about double its measured amount — measured real wages (the wage price index deflated by the consumer price index) rose about 20%, while mismeasured quality means real wages may have grown by about 38%.³⁴

³³ ‘Upper level’ substitution bias refers to substitution bias between broad classes of products, say apples and oranges. While ‘lower level’ substitution bias refers to substitution bias between more granular classes of products say between different types of apple.

³⁴ Calculations using ABS (2022a, 2022e).

Assuming that all the sources of bias listed in table A.2 are applicable to the Australian consumer price index over the past twenty years (June 2001 to June 2021), then real wage growth may have been about 52% over this period, or about one and a half times as much as the published estimates.

These kinds of direct calculation cannot be performed for productivity due to differences in the way that the GDP deflator and consumer price index are calculated. Nonetheless, it is likely that if these estimates of the mismeasurement of consumer price index inflation due to quality improvement/new products are accurate, then productivity is likely underestimated by a similar margin to real wage growth.

Table A.2 – Estimates of the degree of overestimation of the consumer price index due to quality mismeasurement and other sources^a

Bias in the CPI due to quality/new products, outlet bias, substitution bias and total bias (percentage points)

Paper	Quality and new products	Outlet bias	Substitution bias	Total CPI bias
	Percentage points	Percentage points	Percentage points	Percentage points
Boskin Commission (1996)	0.6	0.1	0.45	1.1
Lebow and Rudd (2003)	0.37	0.05	0.35	0.85
Gordon (2006)	0.4	0.1	0.4	1.0
Moulton (2018)	0.37	0.08	0.3	0.87
Total range	0.37-0.6	0.05-0.1	0.3-0.45	0.85-1.1

a. Substitution bias adds the estimated effects of both 'upper' and 'lower' level substitution bias.

Source: Boskin Commission (Boskin Commission 1996); Gordon (2006); Lebow and Rudd (2003); Moulton (2018).

Box A.4 – CPI vs the GDP deflator: why mismeasured consumer prices do not always lead to mismeasured productivity

Why is there more than one measure of aggregate price changes?

Above it was discussed why estimates of productivity growth and economic growth more broadly need to be adjusted for changes in prices. Loosely speaking, the changes in prices of goods and services over time can be aggregated into a single measure that tries to capture the average change in prices across the economy, which is referred to as a measure of 'inflation' (price growth).

There are two main kinds of 'inflation' that are of most interest: changes in the prices of goods produced in Australia and changes in the prices of goods most commonly consumed by Australians. Generally, the former is measured using the 'implicit GDP deflator' while the latter is measured using the 'consumer price index' (CPI).

How does this affect productivity growth?

The GDP deflator is used to convert nominal (not adjusted for price changes) measures of productivity into 'real' (price change adjusted) measures of productivity while the latter is used to (among many other

Box A.4 – CPI vs the GDP deflator: why mismeasured consumer prices do not always lead to mismeasured productivity

things) convert nominal measure of wages into real measures of wages. So while the flaws in the measure of CPI discussed in this section have a one-to-one effect on the measurement of consumer prices they do not always affect measured productivity. There are two reasons for this. First, the GDP deflator has a different basket of goods to the CPI; the GDP deflator contains all the goods and services produced in the Australian economy while the CPI has only the prices of the most commonly consumer goods and services. Second, the methods use different formulas to assign weights to different goods and services and update those weights at different intervals.

The overall effect of these differences on the mismeasurement of productivity compared with the measurement of consumer prices is difficult to determine and no systematic attempts have been made to estimate this difference.

Source: ABS (2015, 2019a).

A.4 The impact of measurement error

Productivity growth not coinciding with increased individual wellbeing can result from flaws in the way productivity is measured. These measurement issues include:

- non-market production — home cooked meals, looking after one's own children, cleaning one's house and undertaking own repairs of property all produce goods and services valued by individuals but they are not recorded in GDP or productivity statistics. This can become an issue where government policy reduces non-market production and increases market production but with a potentially ambiguous effect on wellbeing
- marginal verses average — productivity growth cannot always distinguish between the marginal and the average. For example, if a barrier to labour force participation is reduced and the result is that a previously marginalised group of people join the labour force this might reduce average measured productivity if the productivity of this new group of workers is lower than the economy average. However, if this group of people had previously wished to work but were prevented from doing so due to discrimination, then this likely enhances welfare and the economy itself while reducing measured productivity
- stocks verses flows — productivity and GDP measure the flow of new goods and services being produced but they do not account for the destruction of existing assets. So for example, in some circumstances, a natural disaster, or wars, can (assuming it does not severely damage the productive capital stock) actually lead to an increase in measured GDP and productivity growth but are clearly hugely destructive to individual and economic wellbeing
- utilisation of inputs — while capital stocks can be measured with a reasonable degree of accuracy, measuring the degree to which this stock is being productively utilised is very difficult. As a result, statistical agencies typically assume the capital stock is being fully utilised, which tends to result in productivity being underestimated during recessions (when capital utilisation is falling) and overestimated in economic recoveries (when utilisation is rising). A similar issue arises in measuring mining productivity where measured capital services increase steadily as a mine is being built rather than when the mine is made operational, leading to underestimation of productivity in periods of heavy mining investment and overestimation in subsequent periods of heavy extraction

- sensitivity to environmental factors — agricultural, mining and transport productivity are all affected by the state of the natural environment. For example, whether there is heavy rainfall or drought in a particular year will have a strong effect on agricultural productivity. Likewise, the productivity of mining can depend on how difficult it is to extract particular deposits
- quality changes and new goods — the bias created by new goods and quality improvements to productivity measurement were discussed in chapter 1.

A.5 Projecting the growth of the non-market sector in a simple model

The growth of the non-market sector is likely to have significant consequences for Australian productivity growth into the future. One way to try and understand the productivity growth impact is to model different non-market sector growth scenarios with its productivity relatively stagnant.

The model presented in this appendix uses a simple stylised model of the economy with only two sectors — market and non-market — to show that, depending on assumptions made about consumer preferences, continued productivity stagnation in the non-market sector (even in the presence of strong productivity growth in the market sector) is likely to drag on aggregate productivity growth.

The types of consumer preferences analysed are all relatively simple in the sense that only the relative prices of market and non-market products change consumption behaviour — so long as relative prices stay constant, income has no separate effect on relative non-market services consumption. This is likely an oversimplification, as there is likely an independent effect of income on relative consumption of non-market services as well but inclusion of this effect would likely reinforce rather than weaken the findings presented here.

This model also abstracts from the issues of capital and trade, which would likely also be impacted by the rise of the non-market services sector.

This model is a variant of one presented in Vollrath (2019) and Jones (Jones 2020) that both drew inspiration from the works of Baumol (Baumol 1967, 1982) on cost disease.

The model

Production

There are two sectors, market (M) and non-market (N) that each produce a single output (Y). Each use a share of homogenous labour (L) which they use as their sole input and have an assumed rate of labour productivity in any particular period (A) [this has been set based on the historical rate of 1.66% in the market sector and zero for the non-market sector]. In this model, all output is consumed immediately (no investment) and the economy is closed (no international trade).

Intuition: in this model, only labour is used in production so the only thing determining relative prices of products is how much labour they need. Under the assumption that labour is paid the same no matter where it works, the market sector requiring less and less labour as its productivity rises means that its relative price falls and the relative price of non-market services rises.

Each sector has the same production function:

For the market sector

$$Y_M = A_M L_M$$

For the non-market sector

$$Y_N = A_N L_N$$

Firms receive price (P) for their output.

Labour markets

Each sector pays the same wage and labour is paid its marginal value:

$$w_M = w_N = P_M A_M = P_N A_N$$

Combining these equations we have:

$$\frac{P_N}{P_M} = \frac{A_M}{A_N}$$

This means that prices are completely determined by productivity and that the (relative) price of non-market services will tend to rise as market sector productivity rises and non-market sector productivity does not.

Consumption

Depending on what assumptions we make about consumer preferences, we can get different solutions to the above model.

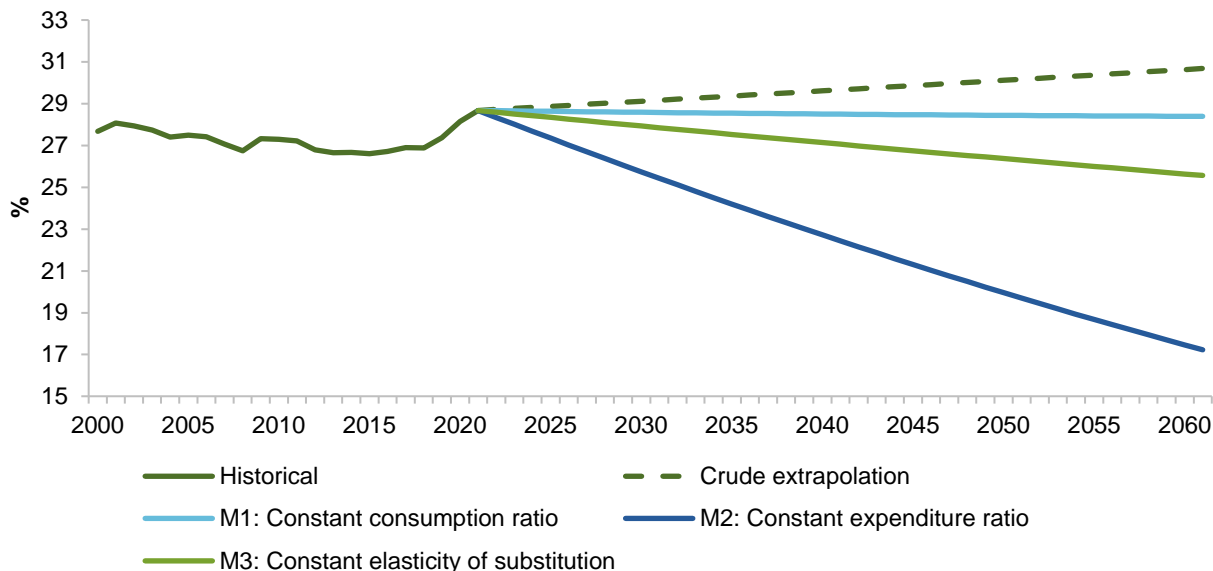
Intuition: given that relative prices are entirely determined by productivity, the only question is how will consumers and governments respond to non-market services getting more expensive? We model three scenarios of varying realism. Note, in all three scenarios there are no pure income effects, consumers only respond to relative price changes.

Projected growth of the non-market GVA share

A feature of this model is that the nominal share of total economic activity of the non-market sector will be identical to its labour share³⁵ so will be the same as shown figure A.3. However, the real share of the non-market sector in total economy GVA tends to either stay constant or fall for all of the models (figure A.2), which is not very different from the historical experience (real relative consumption of total non-market services has increased only marginally). Note that because output and consumption are identical in this model, this is also the real ratio of consumption of non-market to total consumption in the economy.

³⁵ This occurs because the growth in relative prices is equal to the inverse of the growth in productivity, so the necessary terms cancel out and only the share of the labour force determines the industries share of GVA.

Figure A.2 – The non-market sector is not predicted to grow as a share of real GVA
Predicted share of the non-market sector in whole economy GVA by model



Source: Productivity Commission modelling.

When we combine the information from figures A.3 and A.2, one picture that quickly emerges is that as productivity grows in the market sector, Government will have to increase their share of economic activity (and hence taxation) just to maintain the *same* real spend on non-market services let alone increase their real share of expenditure.

One way of interpreting these three models is as four different decision rules for government and consumers to manage rising costs of non-market services:

1. If governments and households grows their expenditure share of non-market services at historical levels, then the crude extrapolation is the result.
2. If governments and households provides the same real quantity of non-market services regardless of growing cost than the result is M1.
3. If governments and households decide that they are unwilling to increase the non-market share of their total expenditure on services (and the share of taxation in the governments' case) in order to fund the same real level of services, then real services will decline in line with M2.
4. If governments and households are about as responsive to price in their purchasing as they have been historically, then the result will be roughly what is seen with M3, a slight fall in the proportion of the economy devoted to nonmarket services.

Model 1: Constant real consumption ratio

Intuition: one extreme is to assume consumers never adjust their consumption based on price and always consume a fixed ratio of market and non-market services. This represents the lower bound of consumer responsiveness and the upper bound of the expected growth of the non-market sector.

Assuming consumers always consume the same ratio of market to non-market goods (C) regardless of price, we can write this as:

$$\frac{C_M}{C_N} = K$$

But all output is consumed ($C=Y$) so:

$$\frac{Y_M}{Y_N} = K$$

Inserting our production functions we get:

$$\frac{L_M}{L_N} = K \times \frac{A_N}{A_M}$$

So the non-market sector will expand as a share of the labour force as the market sector becomes increasingly more productive. This situation can be thought as being similar to a Leontief production function, consumers always want the same ratio of real market and non-market consumption and adjust consumption one-to-one with price changes to maintain this ratio.

Model 2: Constant expenditure ratio

Intuition: the opposite extreme to the above is to assume that consumers will respond one-to-one to any price increases by decreasing real consumption in order to maintain the same share of their budget on non-market goods. This could occur, if for example, governments set a maximum percentage of GDP they were willing to allocate to health or education. This represents the lower bound to the growth of the non-market sector.

Under a second set assumptions consumers allocate a constant proportion of their budget to non-market services. Mathematically:

$$\frac{P_M C_M}{P_N C_N} = K'$$

Rearranging and combining we get:

$$\frac{L_M}{L_N} = K'$$

So the ratio of non-market to market labour is constant over time because consumers do not respond to prices by changing their fixed budget allocations.

Model 3: Constant elasticity of substitution

Intuition: a more realistic assumption is to assume consumers/governments respond to the rising cost of non-market services by cutting back, but not by very much. For example, assuming the elasticity of 0.21, for every 100% increase (doubling) in the price of apples relative to oranges, a consumer will increase her relative consumption of oranges by 21%.

Assuming a constant elasticity of substitution, we can model consumer preferences as:

$$\frac{C_M}{C_N} = K'' \times \left(\frac{P_N}{P_M} \right)^\sigma$$

Where: $0 < \sigma < 1$ is the constant elasticity of substitution. This parameter was set to mimic the historical data as well as possible (this came out to about 0.21, which is relatively unresponsive to prices). K'' is also adjusted to match the historical data.

Results

In most cases, model 1 (M1) with constant consumption represents the upper bound of realistic projections where consumers are assumed to be invariant to price changes (Leontief). Model 2 (M2) could be thought of

the as the lower bound of realistic projections where consumers respond to all relative price changes by cutting consumption proportionally. Model 3 (M3) is a bit of an in between that is slightly more realistic.

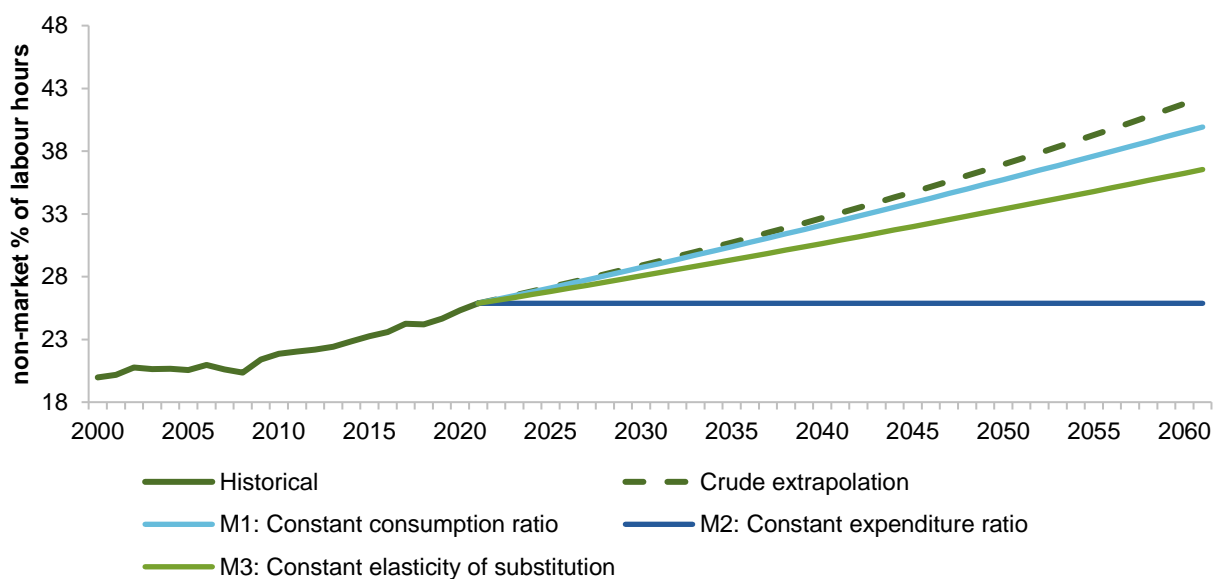
Projected growth of the non-market labour share

All three of these models can be used to project the share of non-market labour over the horizon of the IGR under the assumption that market sector productivity grows at a constant rate (set at 1.66% here) and that non-market productivity does not grow.

Figure A.3 shows that when these assumptions are made, two of the three models are broadly consistent with both each other and the crude projection (which was based on extrapolating past trends outwards). That said, both M1 and M3 appear to give slower expansions of the non-market sector than is implied by simply extrapolating the real world data. The likely reasons for this are that the model is a vast oversimplification of reality and that, historically, the slow growth of non-market labour productivity has not been the sole force driving the expansion of the non-market sector (it is likely that ageing, women entering the workforce³⁶ or international demand for Australian higher education and tourism services have also been contributors).

Figure A.3 – Non-market sector employment is predicted to grow as its relative productivity falls

Non-market sector share of the labour force (%) between 2000-01 and 2060-61



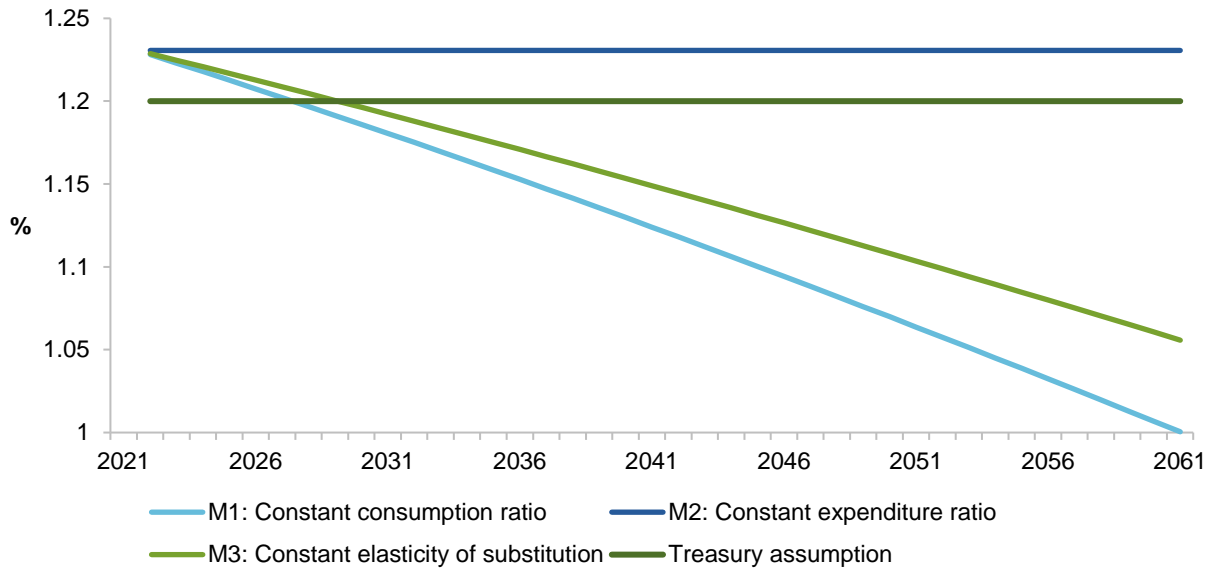
Source: Productivity Commission modelling.

Projected whole economy productivity growth

The shares of the labour force projected by the various models imply different aggregate rates of labour productivity growth across the whole economy (figure A.4). Generally, the faster the non-market sector is predicted to grow, the slower aggregate labour productivity growth will be.

³⁶ Women entering the workforce (or intensifying their participation) reduces the supply of home production and creates demand for replacement market services.

Figure A.4 – Aggregate productivity will fall as the non-market sector expands
Projected whole economy labour productivity growth between 2020-21 and 2060-61



Source: Productivity Commission modelling.

Abbreviations

ABS	Australian Bureau of Statistics
AI	Artificial Intelligence
AIFS	Australian Institute of Family Studies
AIHW	Australian Institute of Health and Welfare
CEDA	Committee for Economic Development of Australia
CFC	Chlorofluorocarbons
CPI	Consumer price index
DESE	Department of Education, Skills and Employment
DISER	Department of Industry, Science, Energy and Resources
DVD	Digital Optical Disk
GDP	Gross Domestic Product
GNI	Gross National Income
GP	General Practitioner
GPT	General Purpose Technology
GVA	Gross Value Added
ICT	Information and Communication Technology
KLEMS	K-capital, L-labor, E-energy, M-materials, and S-purchased services productivity.
MFP	Multifactor productivity
OECD	Organisation for Economic Co-operation and Development
PC	Productivity Commission
PPP	Purchasing Power Parity
R&D	Research and Development
RBA	Reserve Bank of Australia
STEM	Science, Technology, Engineering and Mathematics
UK	United Kingdom
UNICEF	United Nations Children's Fund
USD	United States Dollar

References

- ABS (Australian Bureau of Statistics) 2002, *Mortality and Morbidity: Infant mortality*, c=AU; o=Commonwealth of Australia; ou=Australian Bureau of Statistics, <https://www.abs.gov.au/ausstats/abs@.nsf/2f762f95845417aeca25706c00834efa/d37892d01d1832c3ca2570ec000ace6e!OpenDocument> (accessed 14 June 2022).
- 2013a, *Historical Selected Agriculture Commodities, by State (1861 to Present), 2010-11*, Cat. no. 7124.0.
- 2013b, *The Australian and New Zealand Standard Industrial Classification (ANZSIC), Revision 2 - Chapter 7 Division definitions*, c=AU; o=Commonwealth of Australia; ou=Australian Bureau of Statistics, <https://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/0C2B177A0259E8FFCA257B9500133E10?opendocument> (accessed 21 June 2022).
- 2015, *Australian System of National Accounts Concepts, Sources and Methods*, Cat. No. 5216.0.
- 2017, *Introduction of the 17th Series Australian Consumer Price Index*, Cat. no. 6470.0.55.001., Canberra.
- 2019a, *Consumer Price Index: Concepts, Sources and Methods, 2018*, Cat. no. 6461.0.
- 2019b, *Services in the Australian economy*, <https://www.abs.gov.au/articles/services-australian-economy> (accessed 21 June 2022).
- 2021a, *Australian System of National Accounts, 2020-21 financial year | Australian Bureau of Statistics*, <https://www.abs.gov.au/statistics/economy/national-accounts/australian-system-national-accounts/latest-release> (accessed 18 July 2022).
- 2021b, *Improved estimates of the annual national accounts: Results of the 2021 historical revisions*.
- 2021c, *Working arrangements, August 2021*, <https://www.abs.gov.au/statistics/labour/earnings-and-working-conditions/working-arrangements/latest-release> (accessed 26 May 2022).
- 2022a, *Consumer Price Index, Australia, March 2022*, Cat. no. 6401.0.
- 2022b, *International Trade in Goods and Services, Australia*, <https://www.abs.gov.au/statistics/economy/international-trade/international-trade-goods-and-services-australia/latest-release> (accessed 24 June 2022).
- 2022c, *Labour Force, Australia, December 2021*, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia/latest-release> (accessed 16 February 2022).
- 2022d, *Labour Force, Australia, Detailed*, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/latest-release> (accessed 27 June 2022).
- 2022e, *Wage Price Index, Australia, March 2022*, Cat. no. 6345.0.
- Acemoglu, D. and Linn, J. 2004, 'Market Size in Innovation: Theory and Evidence from the Pharmaceutical Industry', *The Quarterly Journal of Economics*, vol. 119, no. 3, pp. 1049–1090.
- Adedeji, W.A. 2016, 'The Treasure called Antibiotics', *Annals of Ibadan Postgraduate Medicine*, vol. 14, no. 2, pp. 56–57.
- Aghion, P. and Howitt, P. 1992, 'A Model of Growth through Creative Destruction', *Econometrica*, vol. 60, pp. 323–351.
- and — 1998, *Endogenous growth theory*, The MIT Press, Cambridge, Massachusetts.
- and — 2009, *The Economics of Growth*, 1st edn, The MIT Press, Cambridge, Massachusetts.
- AIFS (Australian Institute of Family Studies) 2017, *Population and households*, Text, Australian Institute of Family Studies, <https://aifs.gov.au/facts-and-figures/population-and-households> (accessed 14 June 2022).
- AIHW (Australian Institute of Health and Welfare) 2022, *Australia's children 2022: Data tables – Health*, Australian Institute of Health and Welfare, <https://www.aihw.gov.au/reports/children-youth/australias-children/data?page=1> (accessed 14 June 2022).
- AlphaBeta 2017, *The Automation Advantage*, Sydney, NSW.
- Alvarez, C. 2007, *1908 Ford Model T*, Top Speed, <https://www.topspeed.com/cars/ford/1908-ford-model-t-ar32509.html> (accessed 27 June 2022).
- Andrews, D., Criscuolo, C. and Peter, G. 2016, *The best versus the rest: the global productivity slowdown, divergence across firms and the role of public policy*, OECD productivity working papers, 5, OECD Publishing.
- anonymous 2017, *The 1909 – 1910 Model T Ford Part 4*, Model T Ford Fix, <https://modeltfordfix.com/the-1909-1910-model-t-ford-part-4/> (accessed 27 June 2022).
- Apple 2022, *MacBook Air with M1 chip - Tech Specs*, Apple (Australia), <https://www.apple.com/au/macbook-air-m1/specs/> (accessed 27 June 2022).
- Arrow, K. 1962a, 'Economics of Welfare and the Allocation of Resources for Invention', *The Rate and Direction of Inventive Activity*, Princeton University Press, Princeton.
- Arrow, K.J. 1962b, 'The Economic Implications of Learning-by-Doing', *Review of Economic Studies*, vol. 29, no. 1, pp. 155–173.
- Banks, G. 2005, *Structural Reform Australian-Style: Lessons for Others?*, Productivity Commission Chairman's Speech, Canberra.
- Baumol, W.J. 1967, 'Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis', *The American Economic Review*, vol. 57, no. 3, pp. 415–426.
- Baxter, J. and Warren, D. 2021, *Families in Australia Survey - Towards Covid Normal. Employment & work-family balance in 2020*, https://aifs.gov.au/sites/default/files/publication-documents/2105_2_fias_employment_and_work_family_balance_in_2020.pdf (accessed 19 July 2022).
- Beech, A., Dollman, R., Finlay, R. and La Cava, G. 2014, 'The Distribution of Household Spending in Australia | Bulletin – March Quarter 2014', *Bulletin*, March, <https://www.rba.gov.au/publications/bulletin/2014/mar/2.html> (accessed 19 July 2022).
- Bergeaud, A., Cette, G. and Lecat, R. 2016, 'Productivity Trends in Advanced Countries between 1890 and 2012', *Review of Income and Wealth*, vol. 62, no. 3, pp. 420–444.

- Bergeaud, A., Cette, G. and Lecat, R. 2017, 'Total Factor Productivity in Advanced Countries: A Long-term Perspective', no. 32, p. 19.
- Biro, M. 2021, *How much do Australians spend on new cars?*, Canstar Blue, <https://www.canstarblue.com.au/vehicles/average-car-price/> (accessed 1 July 2022).
- Blockbuster Inc. 2004, *Blockbuster Annual report 2004*, <https://www.sec.gov/Archives/edgar/data/1085734/000119312505063510/d10k.htm> (accessed 17 July 2022).
- Bolt, J. and van Zanden, J.L. 2020, *Maddison style estimates of the evolution of the world economy. A new 2020 update*, Maddison-Project Working Paper, 15.
- Boskin Commission (Advisory Commission to Study the Consumer Price Index) 1996, *Toward A More Accurate Measure Of The Cost Of Living: final report to the Senate Finance Committee*, United States Senate, Washington D.C.
- Bouscasse, P., Nakamura, E. and Steinsson, J. 2021, 'When Did Growth Begin? New Estimates of Productivity Growth in England from 1250 to 1870', p. 50.
- Bradstock, E. 2021, *Overpriced and unnecessary — what do Aussies think of their smartphones?*, Canstar Blue, <https://www.canstarblue.com.au/phone/what-australians-think-about-smartphones/> (accessed 1 July 2022).
- Bresnahan, T. 2010, 'General Purpose Technologies', *Handbook of Economic and Innovation*, vol 2, pp. 761–791.
- Bresnahan, T.F. and Trajtenberg, M. 1995, 'General purpose technologies "Engines of growth"?' Elsevier, *Journal of Econometrics*, vol. 65, no. 1, pp. 83–108.
- Broadberry, S., Campbell, B., Klein, A., Overton, M. and van Leeuwen, B. 2012, *British Economic Growth, 1270-1870: an output-based approach*, Studies in Economics, January, School of Economics, University of Kent, <https://econpapers.repec.org/paper/ukcukcedp/1203.htm> (accessed 5 July 2022).
- Bryjolfsson, E., Rock, D. and Syverson, C. 2018, *The productivity J-curve: how intangibles complement general purpose technologies*, Working Paper 25148, National Bureau of Economic Research.
- Bryjolfsson, E., Rock, D. and Syverson, C. 2017, *Artificial Intelligence and the Modern Productivity Paradox: A Clash of Expectations and Statistics*, 24001, NBER Working Paper Series, National Bureau of Economic Research.
- Butlin, M., Dixon, R. and Lloyd, P. 2015, 'Statistical Appendix: selected data series, 1800-2010', *The Cambridge economic history of Australia*, Cambridge University Press, Sydney.
- Butlin, N. 1969, 'Estimates of Australian Work Force and Employment, 1861-1961', *Australian Economic History Review*, vol. 9, pp. 138–155.
- CEDA (Committee for Economic Development of Australia) 2015, *Australia's Future Workforce?*, Melbourne.
- Chakravorti, B., Bhalla, A. and Chaturvedi, R.S. 2019, 'Which Countries Are Leading the Data Economy?', *Harvard Business Review*, <https://hbr.org/2019-01/which-countries-are-leading-the-data-economy> (accessed 23 May 2022).
- Clark, A.E., Diener, E., Georgellis, Y. and Lucas, R.E. 2008, 'Lags and Leads in Life Satisfaction: A Test of the Baseline Hypothesis', *The Economic Journal*, vol. 118, no. 529.
- Commonwealth of Australia 2021, *2021 Intergenerational Report: Australia Over the Next 40 Years*, Canberra.
- 2022, *Budget Strategy and Outlook: Budget Paper No. 1*, Budget October 2022-23, Canberra.
- Connolly, E. and Lewis, C. 2010, 'Structural Change in the Australian Economy', p. 10.
- Cowgill, M. 2013, *A Shrinking Slice of the Pie: The Labour Income Share in Australia*, Working Paper, 1, Australian Council of Trade Unions.
- Crespi, G., Criscuolo, C. and Haskel, J. 2008, 'Productivity, Exporting and the Learning-by-Exporting Hypothesis: Direct Evidence from UK Firms', *The Canadian Journal of Economics*, vol. 41, no. 2, pp. 619–638.
- Delong, B. 2017, *Do 'They' Really Say: 'Technological Progress Is Slowing Down'?*, Grasping Reality by Brad Delong, <https://www.bradford-delong.com/2017-09/do-they-really-say-technological-progress-is-slowing-down.html> (accessed 7 April 2022).
- Denniss, R. 2003, 'Annual leave in Australia', p. 46.
- DESE (Department of Education, Skills and Employment) 2022, *International student numbers by country, by state and territory*, Text, scheme=AGLSTERMS.AglsAgent; corporateName=Department of Education, Skills and Employment; address=50 Marcus Clarke St, Canberra City, ACT 2601; contact=+61 1300 566 046, Department of Education, Skills and Employment, <https://www.dese.gov.au/international-education-data-and-research/international-student-numbers-country-state-and-territory> (accessed 27 June 2022).
- DISER (Department of Industry, Science, Energy and Resources) 2021, *Australia's greenhouse gas emissions: March 2021 quarterly update*, Canberra.
- Dornbusch, R. 1974, 'Tariffs and Nontraded Goods', *Journal of International Economics*, vol. 42, no. 2, pp. 177–185.
- Easterlin, R.A., Angelescu McVey, L., Switek, M., Sawangfa, O. and Smith Zweig, J. 2010, 'The Happiness-Income Paradox Revisited', *Proceedings of the National Academy of Sciences of the United States of America*, vol. 107, no. 52, pp. 22463–22468.
- and O'Connor, K.J. 2020, *The Easterlin Paradox*, 13923, Discussion Paper Series, IZA Institute of Labor Economics.
- Fair Work Ombudsman 2022, *Australia's industrial relations timeline*, <https://www.fairwork.gov.au/about-us/legislation/the-fair-work-system/australias-industrial-relations-timeline> (accessed 27 June 2022).
- Feenstra, R., Inklaar, R. and Timmer, M. 2015, 'The Next Generation of the Penn World Table', *American Economic Review*, vol. 105, no. 10, pp. 3150–3182.
- Feldstein, M. 2017, 'Underestimating the Real Growth of GDP, Personal Income, and Productivity', *Journal of Economic Perspectives*, vol. 31, no. 2, pp. 145–164.
- Furceri, D., Hannan, S.A., Ostry, J.D. and Rose, A.K. 2018, *Macroeconomic consequences of tariffs*, International Monetary Fund.
- Goolsbe, A.D. and Klenow, P.J. 2018, *Internet rising, prices falling: measuring inflation in a world of e-commerce*, 24649, NBER Working Paper Series, National Bureau of Economic Research.
- Gordon, R. 2006, *The Boskin Commission Report: A Retrospective One Decade Later*, NBER Working Paper 12311, National Bureau of Economic Research, Cambridge, Massachusetts.
- Gordon, R.J. 2018, 'Declining American economic growth despite ongoing innovation', *Explorations in Economic History*, vol. 69, pp. 1–12.

- Hausman, J. 2003, 'Sources of Bias and Solutions to Bias in the Consumer Price Index', *Sources of Bias and Solutions to Bias in the Consumer Price Index*, vol. 17, no. 1, pp. 23–44.
- Irvine, J. 2021, *We get four weeks' annual leave – are we due more?*, The Sydney Morning Herald, <https://www.smh.com.au/business/the-economy/how-did-we-get-four-weeks-annual-leave-and-are-we-due-a-rise-20201216-p56nuk.html> (accessed 15 July 2022).
- Jansz, J. and Gilbert, L. 2017, 'Risk Management in the Western Australia Mining Industry', *World Safety Journal*, vol. 26, no. 2, pp. 2–11.
- Jones, C.I. 2021, *The Past and Future of Economic Growth: A Semi-Endogenous Perspective*, Stanford GSB and NBER.
- Lattimore, R. 2007, *Men Not At Work: An Analysis of Men Outside the Labour Force*, Productivity Commission Staff Working Paper, Canberra.
- Leal, H., Lai, S. and Rosewall, T. 2019, 'Firm-level Insights into Skills Shortages and Wages Growth', *Bulletin*, March Quarter 2019.
- Lebow, D. and Rudd, J.B. 2003, 'Measurement error in the consumer price index: where do we stand?', *Journal of Economic Literature*, vol. 41, no. 1, pp. 159–201.
- Lucas, R.E. 1993, 'Making a Miracle', *Econometrica*, vol. 61, no. 2, pp. 251–272.
- Mankiw, G., Romer, D. and Weil, D. 1992, 'A Contribution to the Empirics of Economic Growth', *The Quarterly Journal of Economics*, vol. 107, no. 2, pp. 407–437.
- Melitz, Marc.J. and Trefler, D. 2012, 'Gains from Trade when Firms Matter', *Journal of Economic Perspectives*, vol. 26, no. 2, pp. 91–118.
- Mokyr, J. 2018, 'The past and the future of innovation: Some lessons from economic history', *Explorations in Economic History*, vol. 69, pp. 13–26.
- Moulton, B.R. 2018, *The Measurement of Output, Prices, and Productivity: What's Changed Since the Boskin Commission?*, Hutchins Center on Fiscal & Monetary Policy at Brookings.
- National Museum of Australia, A.P. 2022, *Eight-hour day*, National Museum of Australia; c=AU; o=Commonwealth of Australia; ou=National Museum of Australia, <https://www.nma.gov.au/defining-moments/resources/eight-hour-day> (accessed 15 July 2022).
- Nelson, R. 1959, 'The Simple Economics of Basic Scientific Research', *Journal of Political Economy*, vol. 67, pp. 297–306.
- Nelson, R.R., Dosi, G., Helfat, C.E., Pyka, A., Saviotti, P.P., Lee, K., Dopfer, K., Malerba, F. and Winter, S.G. 2018, *Modern Evolutionary Economics: An Overview*, 1st edn, Cambridge University Press, <https://www.cambridge.org/core/product/identifier/9781108661928/type/book> (accessed 30 June 2022).
- Netflix Inc. 2021, *Netflix Annual report 2021*, <https://ir.netflix.net/financials/annual-reports-and-proxies/default.aspx> (accessed 17 July 2022).
- Nordhaus, W.D. 2004, *Schumpeterian profits in the American economy: theory and measurement*, 10433, NBER Working Paper, National Bureau of Economic Research.
- North, D.C., Wallia, J.J. and Weingast, B.R. 2006, *A Conceptual Framework for Interpreting Recorded Human History*, 12795, NBER Working Paper, National Bureau of Economic Research, Massachusetts, Cambridge.
- OECD (Organisation for Economic Co-operation and Development) 2022a, *ICT Access and Usage by Businesses*, OECD.stat, https://stats.oecd.org/Index.aspx?DataSetCode=ICT_BUS (accessed 20 May 2022).
- 2022b, *OECD Stat Database*, <https://stats.oecd.org/> (accessed 5 July 2022).
- 2022c, *Broadband Portal*, <https://www.oecd.org/digital/broadband/broadband-statistics/> (accessed 20 May 2021).
- Ofori-Asenso, R., Ilomäki, J., Zomer, E., Curtis, A.J., Zoungas, S. and Liew, D. 2018, 'A 10-Year Trend in Statin Use Among Older Adults in Australia: an Analysis Using National Pharmacy Claims Data', *Cardiovascular Drugs and Therapy*, vol. 32, no. 3, pp. 265–272.
- Parham, D. 2004, 'Sources of Australia's Productivity Revival', *Economic Record*, vol. 80, no. 249, pp. 239–257.
- PC (Productivity Commission) 1999, *Microeconomic Reforms and Australian Productivity: Exploring the Links*, Commission Research Paper, Canberra.
- 2017a, *Rising Protectionism: Challenges, threats and opportunities for Australia*, Commission Research Paper, Canberra.
- 2017b, *Shifting the Dial: 5 Year Productivity Review*, Report no. 84, Canberra.
- 2018, *Rising inequality? A stocktake of the evidence*, Commission Research Paper, Canberra.
- 2019, *PC Productivity Bulletin*, Canberra.
- 2021a, *Innovations in Care for Chronic Health Conditions*, Productivity Reform Case Study, Canberra.
- 2021b, *Things you can't drop on your feet: An overview of Australia's services sector productivity*, PC Productivity Insights, Canberra, April.
- 2021c, *Working from home*, Commission Research Paper, Canberra.
- Pessoa, J.P. and Van Reenen, J. 2012, *Decoupling of Wage Growth and Productivity Growth: Myth and Reality*, Commission on Living Standards. Resolution Foundation.
- Peszko, G., van der Mensbrugghe, D., Alexander, G., Ward, J., Dimitri, Z., Cor, M., Schopp, A., Rogers, J.A. and Midgley, A. 2020, *Diversification and Cooperation in a Decarbonizing World: Climate Strategies for Fossil Fuel-Dependent Countries*. *Climate Change and Development*, World Bank, Washington, D.C., <https://openknowledge.worldbank.org/handle/10986/34011> (accessed 15 July 2022).
- Philippon, T. 2022, 'Additive growth', NBER Working Paper no. 29950, May.
- Romer, P.M. 1986, 'Increasing Returns and Long Run Growth', *Journal of Political Economy*, vol. 94, no. 5, pp. 1002–1037.
- Roser, M. 2013, *Employment in Agriculture*, Our World in Data, <https://ourworldindata.org/employment-in-agriculture> (accessed 17 July 2022).
- and Ortiz-Ospina, E. 2019, *Global Extreme Poverty*, Our World in Data, <https://ourworldindata.org/extreme-poverty> (accessed 10 November 2021).
- , — and Giattino, C. 2020, *Working Hours*, Our World in Data, <https://ourworldindata.org/working-hours> (accessed 10 November 2021).
- Sickles, R.C. and Zelenyuk, V. 2019, *Measurement of Productivity and Efficiency: Theory and Practice*, Cambridge University Press.
- Snoswell, C., L., Caffery, L., J., Taylor, M., L., Haydon, H.M., Thomas, E. and Smith, A.C. 2022, *Telehealth and coronavirus:*

Medicare Benefits Schedule (MBS) activity in Australia, <https://coh.centre.uq.edu.au/telehealth-and-coronavirus-medicare-benefits-schedule-mbs-activity-australia> (accessed 21 April 2022).

Statista 2022, *Number of smartphone subscriptions worldwide from 2016 to 2027*, Statista, <https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/> (accessed 7 April 2022).

Stevenson, B. and Wolfers, J. 2008, *Economic growth and subjective well-being: reassessing the Easterlin paradox*, NBER Working Paper Series, National Bureau of Economic Research.

Syverson, C. 2017, 'Challenges to Mismeasurement Explanations for the US Productivity Slowdown', *Journal of Economic Perspectives*, vol. 31, no. 2, pp. 165–186.

Tesla 2022, *Tesla Model 3*, Tesla, <https://www.tesla.com/model3> (accessed 27 June 2022).

The Economist nd, *Economics A-Z terms beginning with S*, The Economist, <https://www.economist.com/economics-a-to-z> (accessed 22 June 2022).

UNICEF (United Nations Children's Fund) 2018, *7 fast facts about toilets*, Unicef, <https://www.unicef.org/stories/7-fast-facts-about-toilets#:~:text=Fast%20forward%20to%20today>

[%3A%20around,manages%20human%20waste%20at%20home.](#) (accessed 7 April 2022).

Vollrath, D. 2017, *Understanding the Cost Disease of Services*, <https://growthecon.com/blog/What-You-Spend/> (accessed 22 June 2022).

— 2019, *Fully Grown: Why a Stagnant Economy Is a Sign of Success*, 1st edn, University of Chicago Press, Chicago, Illinois.

Wikipedia 2022, *PowerBook 100*, *Wikipedia*, https://en.wikipedia.org/w/index.php?title=PowerBook_100&oldid=1083232611 (accessed 27 June 2022).

Wilkins, R., Vera-Toscano, E. and Wooden, M. 2020, *The Household, Income and Labour Dynamics in Australia Survey: Selected Findings from Wave 1 to 18*, The 15th Annual Statistical Report of the HILDA Survey, Melbourne Institute of Applied Economic and Social Research, Melbourne, Victoria.

Wilson, J. 2014, 'Government and the evolution of public policy', *Cambridge Economic History of Australia*.

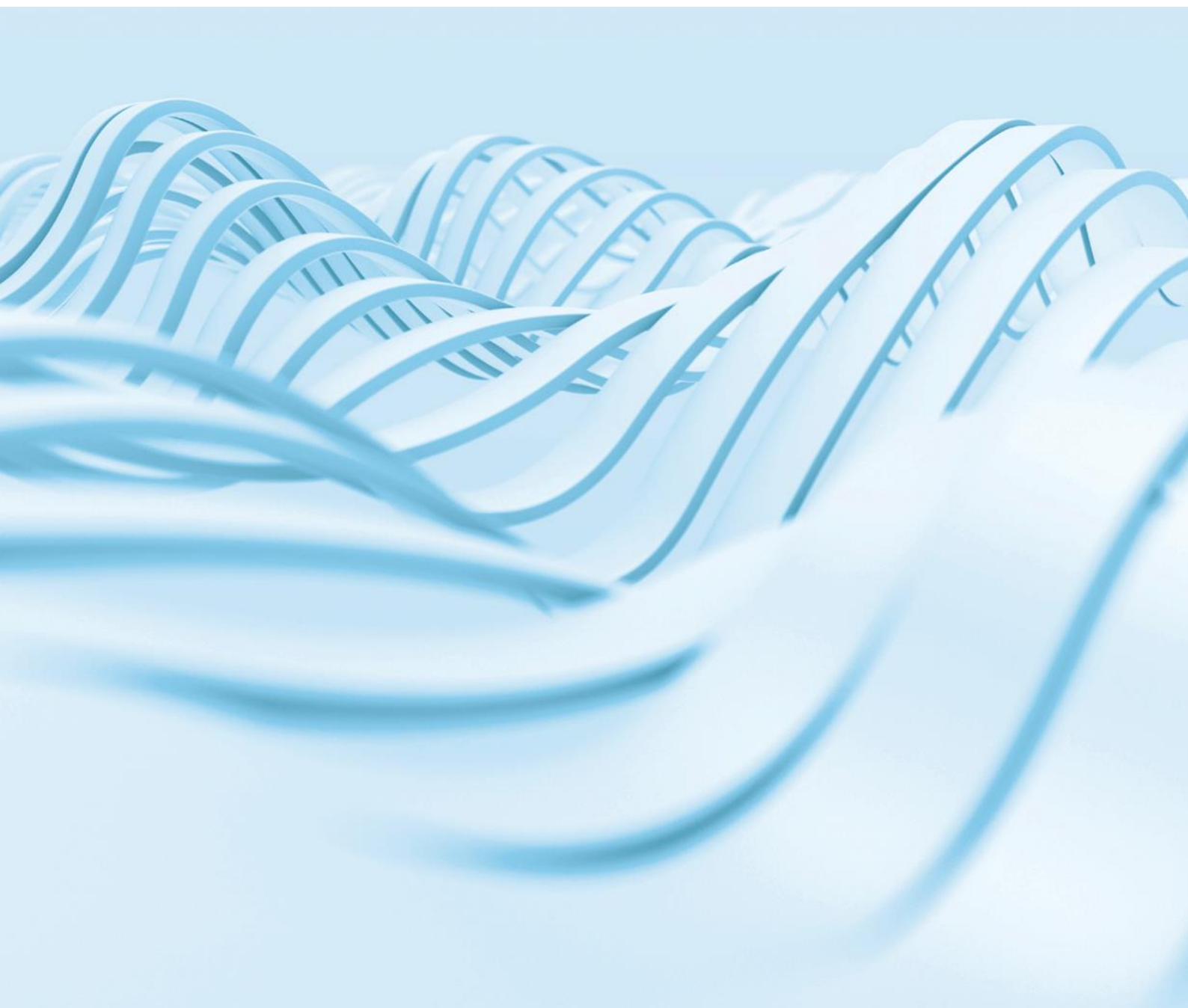
World Bank 2022a, *An adjustment to global poverty lines*, The World Bank, <https://blogs.worldbank.org/voices/adjustment-global-poverty-lines> (accessed 30 June 2022).

— 2022b, *Population, total*, The World Bank: Data, <https://data.worldbank.org/indicator/SP.POP.TOTL> (accessed 7 April 2022).



5-year Productivity Inquiry: A competitive, dynamic and sustainable future

Inquiry report – *volume 3*



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The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

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ISSN 1447-1337 (online)

ISSN 1447-1329 (print)

ISBN 978-1-74037-759-1 (set)

ISBN 978-1-74037-762-1 (volume 3)

An appropriate reference for this publication is:

Productivity Commission 2023, *5-year Productivity inquiry: A competitive, dynamic and sustainable future*, Vol. 3, Inquiry Report no. 100, Canberra

Publication enquiries:

Media, Publications and Web | phone 03 9653 2244 | email publications@pc.gov.au

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The Commission's report is divided into 9 volumes: an overview document (volume 1) that presents our policy agenda, and inquiry content volumes (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda, including a modelling appendix. The full report is available from www.pc.gov.au.

Preface

Productivity is driven in large part by everyday decisions made by people in businesses: about what to produce and how to produce it; about adopting new ideas, technologies and processes; and about developing new and better-quality goods and services. These decisions are shaped by the commercial realities and incentives that businesses face, including the state of competition in product and service markets. Dynamic and competitive markets allow productive firms to flourish and for resources to shift to higher-value uses.

Well-established policy and regulatory principles can help to create a business environment more amenable to productivity growth. In part, this involves promoting contestability of markets and openness to global competition and investment. It involves ensuring that prices are able to reflect market forces and account for social costs; and that risks are managed efficiently by those best placed to do so.

However, achieving this in the current economic climate will present a unique set of challenges for government.

Both the **aftermath of the global pandemic** and the **ongoing uncertainty and volatility of global trade** have highlighted the importance of economic resilience. While supply-chain issues need to be dealt with, businesses generally have the incentives and capacity to do so efficiently. The need for resilience must not veil revitalised protectionism or selective industry policy, given the inefficiency and rent-seeking they bring. For a small, advanced, open economy like Australia, trade and foreign investment remain vital channels for competition and the diffusion of innovation.

At the same time there is some **concern about the state of competition as indicated by aggregate metrics**. However, aggregate trends in competition and business dynamism belie the complexity of influences, and blunt regulatory responses risk unintended effects. A well-functioning competition regime is vital, but governments can do more to promote contestability and competition than simply guarding against anti-competitive conduct (which often is not at issue). Other key policy levers include broad economic settings (not least our openness to foreign direct investment and trade); industry-specific interventions (particularly in services where governments already have a significant role in the market); and the broader regulatory framework facing businesses.

In addition, **non-mining investment has been stagnant by historical standards**. Efficient investment and productivity go hand in hand — and low investment can be a symptom, as much as it is a cause, of low productivity growth. Low investment likely reflects both structural and cyclical factors — global uncertainty, high risk premia and compositional shifts in the economy. To this end, policy should neither attempt to promote investment for its own sake, nor to ‘reverse’ long-term structural shifts, such as the growth of the services economy or the increasing role of online retail over brick and mortar businesses. And while a holistic review of the tax and transfer system to enhance productivity would be valuable, narrow tax incentives to bring forward investments are unlikely to boost long term productivity growth. But governments do have a critical role to play in the efficient provision — and pricing — of public infrastructure, and minimising the distortionary effects of public expenditure and regulatory impediments to private investments.

1. Competitive and dynamic markets

Key points

- * **Competitive and dynamic markets drive productivity growth by encouraging and rewarding businesses that develop new and better-quality goods and services and adopt more efficient production methods.**
 - Relatively slow investment growth, dampened business dynamism and poor incentives for innovation in the rapidly growing government-dominated services industries are acting as a collective handbrake on Australia's productivity growth.
- * **Competition and business dynamism, when measured at an aggregate level, appears to have declined. But economy-wide metrics give limited insight into the drivers of competition in individual markets, and what action — if any — may be warranted. Examination of particular sectors could help identify where consumers face limited product choice, where contestability is lacking, and where policy changes could improve market outcomes.**
 - Promoting competition and dynamism will require a suite of policy levers and often a sectoral focus — particularly where contestability is lacking and where government regulation and funding have significant influence.
 - The competitive landscape could be reshaped over time were emerging trends to continue, particularly with regard to the use of e-commerce and tele-services, international trade in services, and the proliferation of new technology-enabled business models.
- * **Competition laws must remain fit for purpose in the context of contemporary challenges. Principles of good regulatory design can help ensure any reforms will promote and not hinder productivity.**
 - There are risks in designing specific competition rules for particular industries (such as digital platforms).
 - New questions have arisen regarding the nexus between competition law and workplace relations regulation, due to both the emergence of the gig economy and new multi-enterprise bargaining agreements.
- * **Governments should focus on sectors where regulations unnecessarily impede new entrants and where various forms of government involvement (such as public funding, provision, and regulation) can inhibit contestable and competitive markets, increasing costs while diminishing outcomes for consumers.**
 - Prime examples include scope for competition-promoting reforms with regard to planning and zoning, and the regulatory arrangements for private health insurance and pharmacies.
 - More broadly, reform of Australia's risk protection and social insurance arrangements could improve productivity and consumer outcomes. Further review should focus on encouraging individual entrepreneurship, removing barriers to innovative service models, and fostering efficient early intervention and mitigation.

This chapter will discuss the importance of competition and dynamism for driving productive outcomes in the Australian economy including:

- the links between competition and productivity (section 1.1)
- the current state of competition in the Australian economy and potential future trends likely to impact competition in the Australian economy (section 1.2)
- the regulation of competition by governments (section 1.3)
- opportunities to harness competition to make government-run services more productive (section 1.4).

1.1 Competition, dynamism and productivity

Well-functioning markets that are competitive and dynamic are a crucial mechanism for promoting productivity growth. Competitive pressures, combined with the commercial imperative to be profitable, lead businesses to:

- innovate and experiment with new ways of doing things that improve their operating efficiency
- invest in improved means of production
- develop new and better-quality goods and services.

As more productive firms increase their market share by providing better, cheaper goods and services, they crowd out less productive firms. The repetition across time of this competitive cycle drives productivity growth in individual markets and can aggregate up to economy-wide productivity growth.

However, from the perspective of the policymaker, defining the exact characteristics of a market that make it 'productive' is not simple, and they tend to vary from market to market.

For example, healthy competition does not necessarily require a large number of competitors. In markets where there are economies of scale and where firms need to generate profits to internally fund investments, a market with a small number of competitive firms may be more efficient than a market with many small firms. Competition can also push businesses to reach a scale that minimises costs. This may involve only one or a few businesses operating successfully, particularly where there are 'natural monopoly' characteristics or 'star firms' (Andrews and Hansell 2019). There is little concern for productivity if competition, even in a market with a few competitors, is vigorous. But high rates of market concentration (where the share of turnover in a market attributable to one or a few firms is high) raises the risk that competition will be muted — undermining incentives for innovation, and leading to higher prices¹ — a risk that motivates Australia's competition regulations.

Australian markets may be more concentrated than those in larger economies, or may have smaller firms in the competitive fringe than in larger markets. Some argue that small businesses may lack the managerial resources and incentives to innovate — this may particularly be the situation for businesses that are 'falling behind' their rivals (Aghion, Akcigit and Howitt 2013). In such circumstances, it may be business failure or new entry that releases the 'gale of creative destruction' to improve productivity in the relevant market. Such disruption also imposes costs on business owners and employees, such as bankruptcy and temporary or long-term unemployment, and these costs may differ between industries (Cairó 2013).

Even in markets where there are few observed domestic players at a given point in time, contestability of that market — including possible entry from potential domestic competitors or the threat of competition from

¹ As noted by Schumpeter (1911), businesses have an incentive to minimise competition by maximising market share and exploitation. In practice, this can lead to muted price competition. For instance, interest rates on credit cards in Australia did not decrease between 2011 and 2021 despite the cash rate being lowered from 4.75% to 0.10%. That the four largest banks hold 92% of all credit card loans has been cited as an explanation (Jericho 2022).

overseas imports — can weaken any link between market concentration on the one hand, and productivity, costs and consumer welfare on the other.

Governments can shape markets in many ways

There is no ‘one size fits all’ model for regulating market competition to maximise long-term welfare gains for consumers. Typically, the strength of the competitive *process* (rather than the number or size of businesses in a market per se) drives a wide range of market environments that underpin productivity growth.

Governments have a role in building the foundations for competition and business dynamism to boost productivity. Regulatory settings that favour contestable markets (ones where there are low barriers to entry and exit) and dynamic markets (ones where market participants regularly enter and exit) can facilitate productivity growth because competitive tensions created in such markets promote innovation and the allocation of resources to their most productive use over time.

On the other hand, narrow targeting of competition proxies can lead to poor outcomes. For instance, markets for some online services or technological hardware are often provided by large, integrated companies at the frontier of technology, in heavily concentrated markets. On one hand, the presence of (positive) network externalities and economies of scale can mean that larger firms deliver better products at a lower cost. On the other hand, the absence of genuine contestability can risk poorer outcomes to the end user (through higher mark-ups and poorer incentives to improve quality). In setting policy, governments should always consider the extent to which *consumers* benefit from competition, and how this weighs against countervailing effects.

While Australia has in place a sophisticated system of competition regulation to promote competitiveness and contestability of markets, the influence of many other policy settings (including the broader regulatory environment) can be just as significant.

1.2 The state of competition

Many sectors of the Australian economy are relatively concentrated. The banking, supermarkets, mobile telecommunications, internet service provider, fuel wholesale and retail, and general insurance sectors all have four-firm market shares of 70% or more. While the average level of concentration in these sectors has not changed much since the early 2000s (Minifie, Chisholm and Percival 2017, pp. 14, 27), recent studies indicate that across a number of aggregate measures, proxies for competition and business dynamism have declined in Australia in the past two decades.

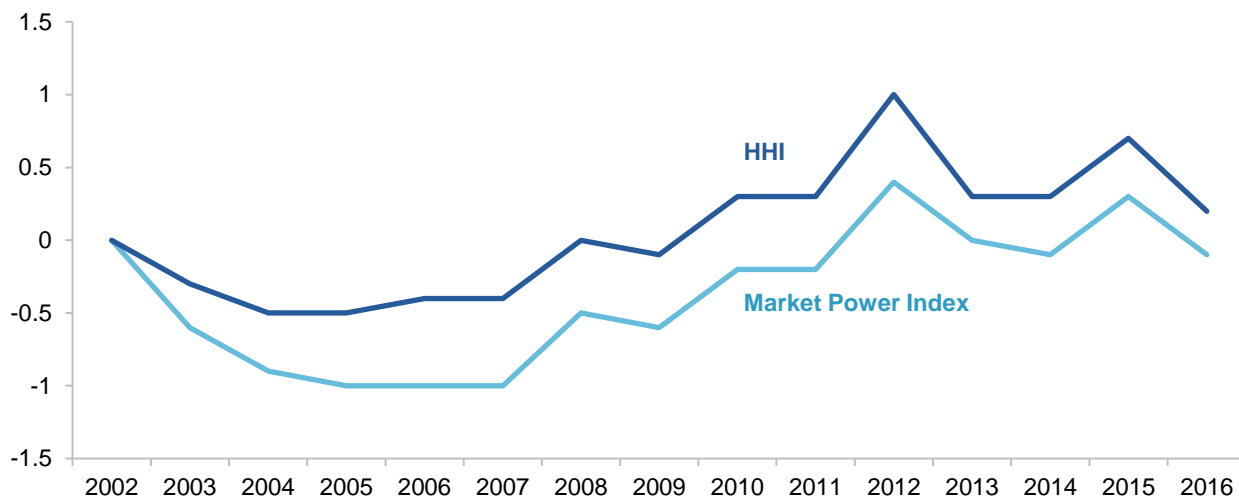
Recent trends in competition and dynamism

Overall concentration in the Australian economy increased between 2002 and 2016 (figure 1.1). The rise in concentration has occurred alongside a decline in entrepreneurship, but there is no evidence that this relationship is causal (Bakhtiari 2020). Market concentration and productivity are negatively correlated, except in export-intensive industries, where the relationship is reversed (likely due to intense competition in international markets) (Bakhtiari 2019).

Industry-specific data shows that market concentration trends have varied by industry, with stark increases in concentration in some industries (such as Warehousing and storage services) while many others became less concentrated (such as Basic non-ferrous metal manufacturing) or remained at similar levels of concentration (such as Coal mining) (figure 1.2). Relatively few industries experienced a sustained, significant increase in concentration over this time period. This variation suggests that factors influencing market concentration have not been consistent across the economy. Moreover, even at the industry-level,

market concentration is only a partial indicator of competition — it may be the case that a small number of firms competes vigorously and/or that more efficient firms have gained market share over time. Indeed, measures of market concentration at the national level are not useful where there are monopolies in different regions (such as the case with some regulated natural monopolies like energy transmission).

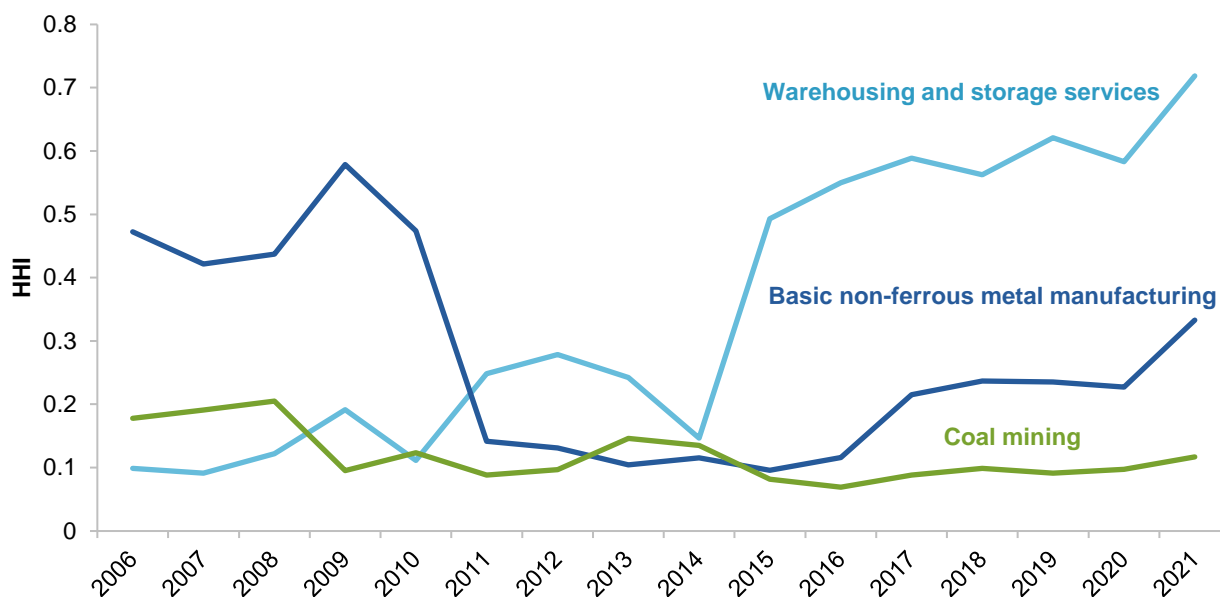
Figure 1.1 – Industry concentration has increased since the early 2000s
HHI and market power indices^a



a. The Herfindahl-Hirschman Index (HHI) is a measurement of the concentration of economic activity. The market power index is the principal component of the HHI and the log of firm population.

Source: Adapted from Bakhtiari (2020).

Figure 1.2 – Market concentration in different sectors
HHI by ANZSIC 3-digit

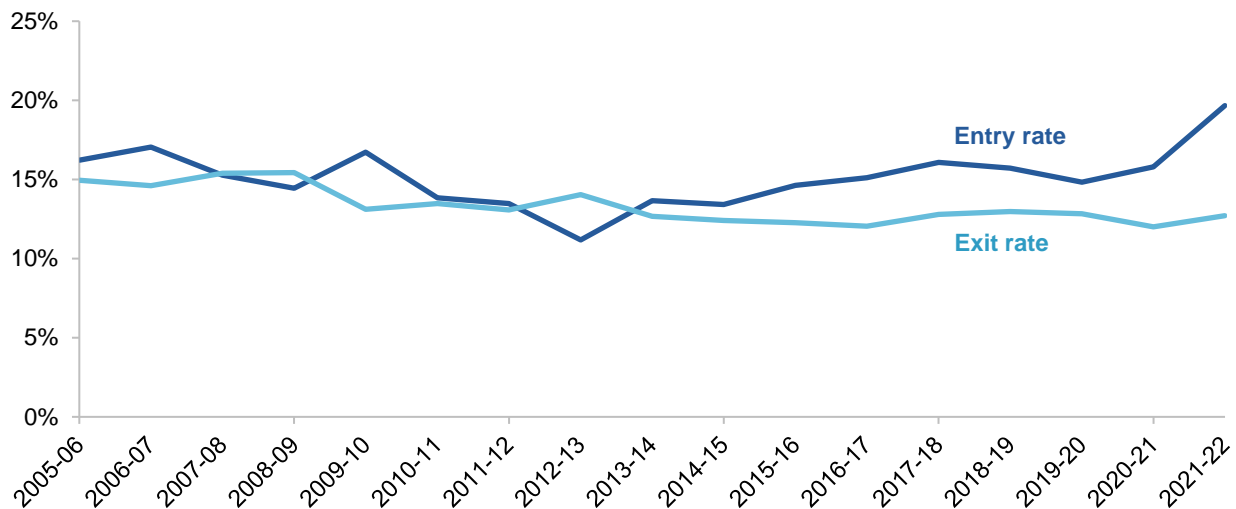


Source: Productivity Commission estimates based on BLADE.

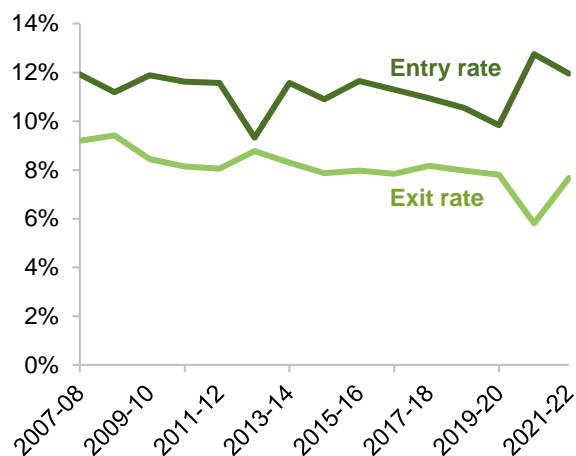
Rates of firm entry and exit declined between 2005-06 and 2012-13 (figure 1.3). While Bakhtiari (2018) highlights that business churn had been declining in Australia between 2003 and 2015, the rate of firm entry had increased in the years prior to the pandemic, but exits continued to decline. Both entry and exit rates fell at the onset of the pandemic, but increased in 2021. The vast majority of Australian businesses are non-employed — comprising sole traders and independent contractors. Trends in dynamism differ somewhat between employing and non-employed businesses (figure 1.3 panels b and c), potentially influenced by developments such as COVID-related assistance and growth in the gig economy.²

Figure 1.3 – Firm entries and exits in Australia^a

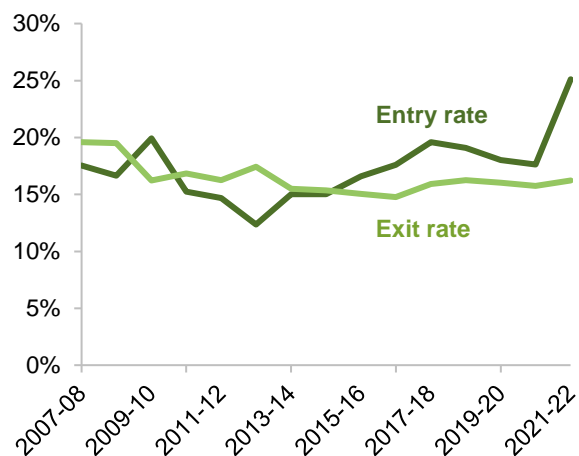
a. Firm entry and exit rates, all businesses



b. Firm entry and exit rates, employing businesses



c. Firm entry and exit rates, non-employed businesses



a. Entry and exit rates are expressed as a percentage of the number of businesses operating at the beginning of the period. Source: ABS (*Counts of Businesses, Including Entries and Exits*, various issues, cat. No. 8165.0).

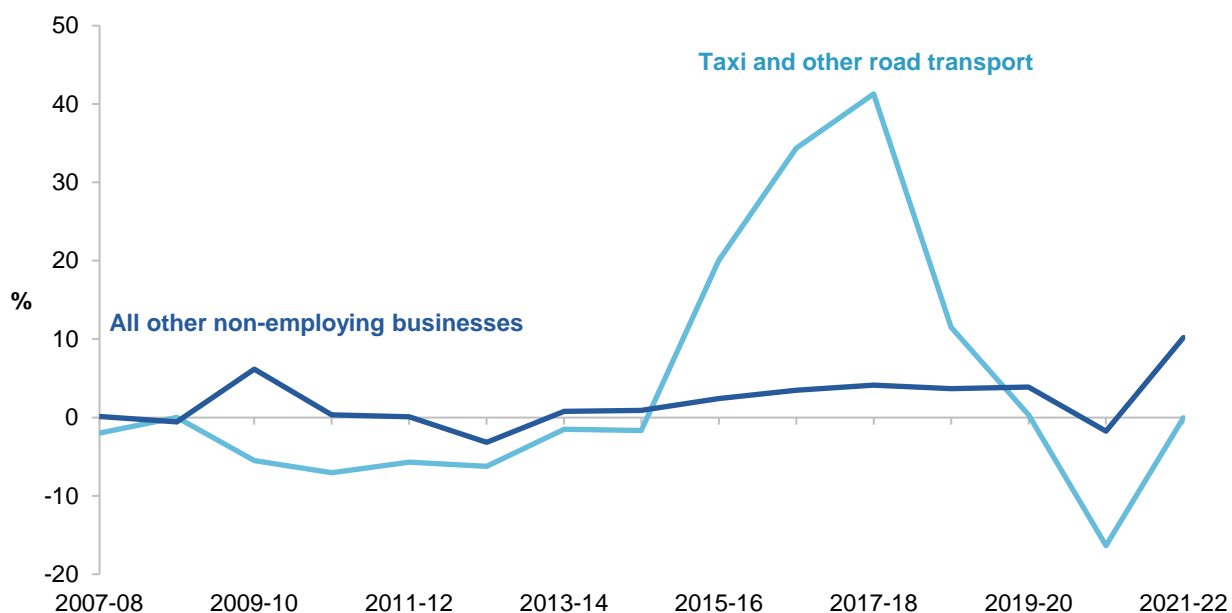
² For example, a substantial amount of COVID-19 related assistance provided in the second half of 2019-20 and during 2020-21, focusing largely on employing businesses. In addition, the gig economy has come to prominence during the past decade, likely affecting the counts of business entries.

The overall increase in firm entries in the past decade is concentrated among sole traders and independent contractors. This may reflect that both rideshare and food delivery have facilitated the entrance of a significant number of independent contractors in urban transport (figure 1.4). However, given that many of these contractors work for the same few platforms (and may not effectively compete with each other) the absolute number of contractors is likely to overstate their contribution to competition and business dynamism.

The decline in firm exit rates, in particular, of both employing and non-employing businesses, could be indicative of reduced competition and limited pressure for resources used in less productive businesses to shift to more productive businesses.

Figure 1.4 – Business entry numbers may reflect the switch between employment and independent contracting^a

Percentage change in the number of non-employing businesses



^a Most transport platform-based workers are engaged on an independent contractor basis and as such require an Australian Business Number. As such, the significant increase in the share of employing businesses that have entered into the transport industry since 2014 is likely to be a reflection in the growth of platform-based work.

Source: ABS (*Counts of Australian Businesses, Including Entries and Exits*, various issues, Cat. no. 8165.0).

Mark-ups are likely to have increased. Firm mark-ups on their input costs — possible when competitive pressures are weak — are estimated to have increased steadily between 2004 and 2017 (Hambur 2021).³ The observed mark-ups could be the result of declining competition, but could also be due to changes to technology that increase economies of scale; shifts towards products and services that involve more fixed costs; or increasing competition encouraging businesses to provide better products that earn higher margins (Wainscoat and Twort 2022). (Others have noted estimated trends in mark-ups should be treated with

³ The best prevailing estimates of mark-ups are based on proxies without the benefit of firm-level price data, although Hambur (2021) notes that this is more likely to affect levels rather than the estimated changes over time.

caution when firm-level prices are not observed, and that making inferences from common methods of approximation can be problematic.)⁴

Overall, these trends in aggregate concentration, mark-ups, and dynamism appear to align in suggesting that markets may have become less competitive. However, interpreting these results requires deeper analysis. For example, economic activity *might* have skewed towards markets that are traditionally less competitive, such as some non-traded services; alternatively, market shares *might* have skewed further towards larger players within markets.

More importantly, it remains the case that aggregate trends do not necessarily translate to the consumer experience of competition. Even when broken down by industry, the nation-wide level of concentration may say little about the degree of competition experienced by consumers in a given area. Rossi-Hansberg, Sarte and Trachter (2020) studied the United States and found that in most industries, the growth of larger firms at a national level helped to reduce concentration and increase product market competition at a local level, by the larger firms entering uncompetitive local markets. Whether this holds for Australia is unknown as most large national businesses already have a presence in local markets. But the caveat stands that it is difficult to infer how the degree of consumer choice may have changed in particular localities or for particular products and services notwithstanding an apparent decline in industry-level competition.

As discussed above, competition not only depends on existing firms in a market. It also depends on the potential for entry of new businesses into a market when profits are high or consumer choice is low. However, the *contestability* of a market is not immediately observable in market concentration and dynamism statistics.⁵ Even markets with a small number of firms may be highly competitive if there is the credible threat of entry (Baumol 1982). In principle, it is the threat of entry rather than actual entry that drives contestability. It depends on low barriers to both entry and exit by business. That said, if there is little history of actual entry in a market, despite high concentration and high profits, the market is probably not contestable, even if barriers to entry and exit cannot easily be identified.

Trends that could reshape the competitive landscape

While no one can accurately forecast how the economic landscape will change over the coming decades, some emerging trends could potentially have a significant bearing on the extent of competition in Australian markets for both consumers and producers.

Further growth in e-commerce and tele-services would improve contestability

The increasing use of e-commerce, as opposed to local brick and mortar stores, can improve contestability by reducing the importance of geographic location. This has the effect of increasing effective competition from the consumer's perspective. Australian businesses have increasingly adopted digital technology, and barriers to offering e-commerce are relatively low (discussed in volume 4). Barriers to consumers are also low, given practically all Australians are within the coverage of some form of digital and physical network for

⁴ Bond et al (2021) cautioned against making any inferences from firm-level markup estimates when firm-level prices are not observed. They note that 'the implications of this so-called omitted price bias for identifying markups are much more severe than just generating downward bias in the ratio estimator. Under the standard assumption that the flexible input and the output price are determined from a static profit maximization problem, the ratio estimator that uses the revenue elasticity in place of the output elasticity is identically equal to one, and therefore contains no useful information about markups'.

⁵ Baumol defined a contestable market as one where entry is free and exit is costless (Baumol 1982, p. 3), although a more practical interpretation would be that barriers to entry and exit may be relatively low.

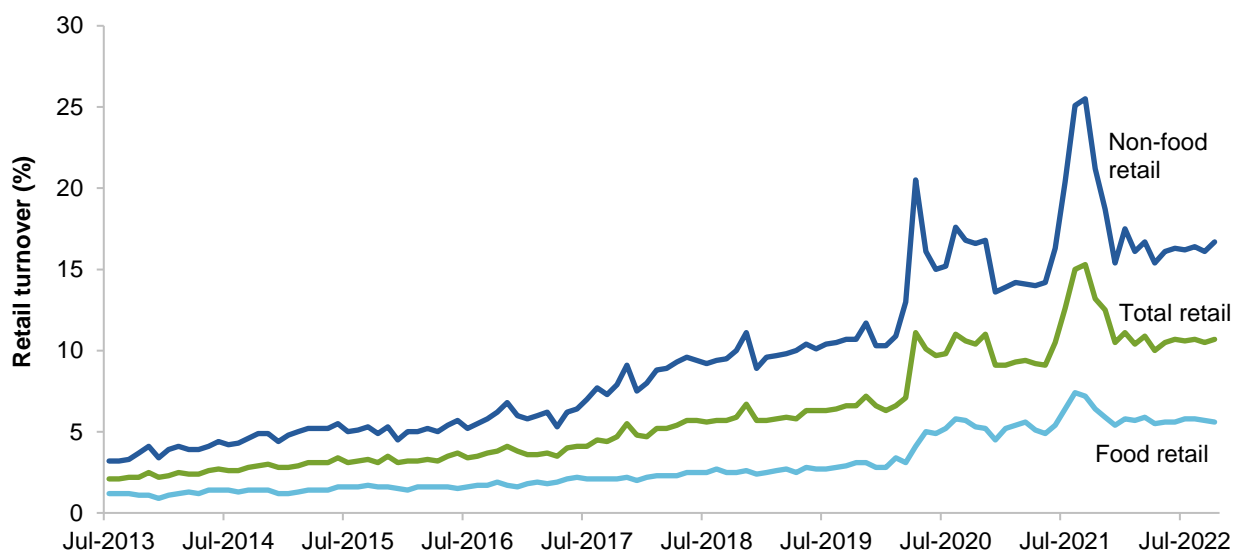
both internet access (of services) and parcel delivery (for physical products), albeit the quality and cost of accessing those networks can differ markedly.

Australian consumers have generally embraced e-commerce. For instance, online retail trade has grown substantially as a percentage of retail turnover in the past decade, most markedly during the pandemic (figure 1.5). It has remained well above pre-pandemic levels, particularly for non-food products. Some survey evidence suggests that Australian habits with regard to online shopping remain behind comparable countries such as the United Kingdom and United States.⁶ To the extent that more consumption can be done, and is done online, physical barriers to competition become somewhat irrelevant, and hence will diminish.

These effects are magnified to the extent that *services* are consumed online, given that services delivered face-to-face would be subject to significant physical barriers to competition. Australian consumption of services online increased significantly during the pandemic, although it is unclear to what extent this will persist.⁷ Moreover, given that similar changes in service consumption and delivery occurred around the world, there could be scope for a much greater trade in services online.

Figure 1.5– Online retail has remained above pre-pandemic levels

Online retail as a share of retail turnover, July 2013 to October 2022



Source: ABS (*Retail Trade, Australia*, October 2022, Cat. no. 8501.0, table 23).

More competition in services will come from overseas

In the 2010s a number of global trends and developments led to strong growth in Australia's services exports, particularly in education and tourism, which came to an abrupt halt due to border closures related to the COVID-19 pandemic. However, as the world reopens Australia's services sector — which accounts for a large (and still increasing) proportion of Australia's domestic production — which has typically not been subject to direct import competition, may face new competitive challenges.

⁶ 25% of Australians shop online on a weekly basis compared with the 38% in the United States and 34% in the United Kingdom (Australia Post 2022).

⁷ In June 2022, 45% of adult internet users worked from home, while 28% studied from home, 52% used online telehealth (an increase compared with the previous two years), and 16% used professional (e.g. legal/financial) consultations (ACMA 2022).

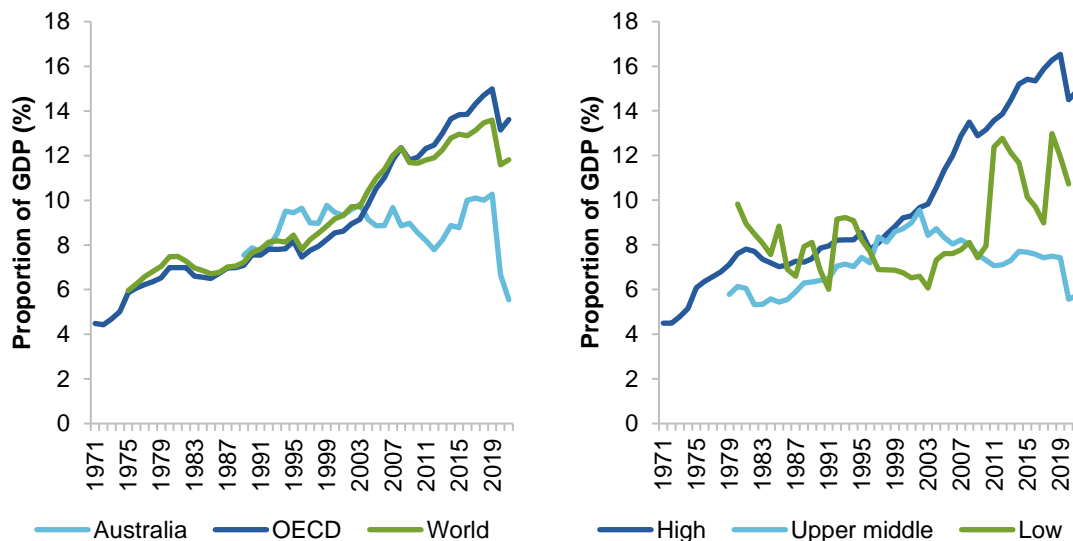
Several global trends suggest that global trade in services will continue to expand, with implications for both Australian service exports and imports. The long-term increase in incomes in developing nations have increased accessibility of international travel and demand for sophisticated services. More recently, the spread of faster internet connectivity has allowed services to be delivered remotely that would not have been possible a decade ago. The COVID-19 pandemic supercharged the utilisation of remote working technology and normalisation of cross-border supply of a greater number of services.

At the same time, the response to COVID-19 had a strongly negative effect on Australia's two main service exports — education (primarily to on-shore international students) and tourism. And while international borders have reopened, travel patterns for study and tourism have not returned to pre-COVID levels. As a result, Australia's service exports have recovered less strongly than its trade in goods — and less strongly overall than other advanced countries (figure 1.6).

This suggests that opportunities for Australia's trade in services are likely to grow post-COVID — to the extent that Australian consumers are willing to purchase service imports (and not constrained by various regulatory factors discussed in chapter 3), there could be a significant increase in import competition. For Australia's major service exports, harnessing these opportunities may require some adaptation. This has already been the experience of Australia's education exports, which underwent a pivot towards 'cross border supply' (i.e. remote learning) to supplement its reliance on consumption abroad (i.e. migration of international students). The onus rests largely on businesses to adapt to these new circumstances, including by investing in new technological solutions — potential roles for government in facilitating trade in services are discussed further in chapter 3.

Figure 1.6 – Trade in services as a proportion of GDP

Trade in services by national grouping; trade in services by national income



Source: World Bank (2022b).

Novel business models could improve competition in services

Different kinds of digital platforms⁸ have proliferated in the past decade, each with unique implications for competition. Platforms that match competing businesses with customers have facilitated the entry of independent contractors and microbusinesses in such industries as care services (e.g. Mable) odd jobs (e.g. Airtasker) or freelance professional services (e.g. Fiverr, Upwork). These platforms can serve as incubators for novel service offerings, and help to lower the costs of entry for small businesses.

Other platforms have improved competition in services by acting as service providers (rather than intermediary services for competing businesses). These platforms provide services under their own brand name with a workforce typically comprised of independent contractors. These businesses have established themselves as competitors to longstanding incumbent service providers, most notably in transport services where rideshare services compete with taxis.

A key question for governments relates to how new business models are regulated. It will be important to find a balance between facilitating experimentation and the introduction of new business models, while also moving quickly enough to address unacceptable harms to consumers.

- Innovations with lower risks of harm are likely to benefit from regulatory ‘sandboxes’. Such approaches are increasingly commonplace in Australia and internationally as a means of facilitating the entrance of new products or services (PC 2017c). The Enhanced Regulatory Sandbox (ERS), for instance, was introduced in September 2020 to facilitate the testing of innovative financial services or credit activities (ASIC 2020).
- Technologies with greater risks of harm and those that entail significant complexity are likely to benefit from advance preparation of regulatory frameworks. This has been the case with regard to the National Transport Commission’s development of a regulatory framework for autonomous vehicles (NTC 2016), and could be of broader use for ‘deploying data-driven products and services at scale’ (Consumer Policy Research Centre, sub. 19, p. 5).

Ultimately, regulation should aim to achieve neutrality across business models that can meet socially accepted standards (in terms of delivering social benefits or limiting social harms) allowing different means of providing services to end consumers. Ensuring that new and incumbent businesses are expected to deliver the same social outcomes will not always require the enforcement of identical regulations — indeed, novel regulatory approaches will need to be developed. These issues are exemplified with regard to platform-based work (also known as ‘gig work’) and its implications for workplace relations (volume 7).

Promoting neutrality between business models will be particularly important for Australia’s decarbonisation efforts and the policy objective of reaching net zero emissions by 2050 (discussed in volume 6). The overall task of emissions reduction will entail the use of several relatively novel business models, predicated on different technologies (for instance, in carbon capture and storage, energy generation, and energy storage). As technology continues to develop, this will give rise to new and better approaches to mitigation. Encouraging abatement at least cost generally will require a mechanism such that different technologies can compete on effectiveness and efficiency.

The absence of an economy-wide price on carbon emissions brings greater risk that public and private investment fails to adopt the most efficient and effective technologies. Moreover, while governments have a

⁸ The term ‘digital platforms’ is used to describe a number of different services, including digital marketplaces in which users sell or rent goods to consumers (e.g. AirBnB, Facebook Marketplace and Gumtree); platforms for internet-based services, such as search engines, social media services, or digital content aggregation services; or platforms that facilitates matching between service providers (or workers) and service users (or tasks). Chapter 5 in Volume 7 of this report focuses more specifically on digital platforms that facilitate platform work.

role in driving the development of abatement technologies, preferencing the use of particular technologies over others risks reducing contestability and efficient abatement. A technology-neutral approach would avoid the introduction of new barriers to contestability as climate change policy develops.

Market entry could be subdued if business investment remains stagnant

Non-mining business investment in Australia has stagnated over recent decades, with a number of other advanced economies experiencing similar trends. Although measured investment levels may underestimate investment in intangibles, which is increasingly important to service industries,⁹ this alone does not appear to explain the decline. A number of cyclical and structural factors play a role (chapter 2).

To the extent that investment remains stagnant, this would not only affect innovation and expansion in existing businesses, but also the number of new businesses entering the market. In this context, it would be important to establish to what extent trends in business entries are the result of regulatory and other barriers to entry in specific markets, or whether they reflect broader trends in investment.

Moreover, it is difficult to anticipate the sources of competition in different industries, and thereby what type of investment will be relevant. In some cases, new market entrants will arrive from overseas (via foreign direct investment) or will entail expansions of large existing businesses in other sectors (involving investment in horizontal integration). In other cases, competition might take the form of a large number of small new entrants, or a disruptive business model (both of which might be associated more with venture capital).

Implications for policy

It is not clear from the existing research what is driving the aggregate trends in competition and dynamism, nor what action governments should take (if any). For instance, the aggregate trends in competition, such as increasing overall concentration, are not in themselves evidence of poor outcomes for consumers (or that anti-competitive conduct has gone unchecked).¹⁰ And while there are examples where markets have lacked contestability, it is not clear that there is a crisis regarding the degree of competition across the Australian economy.

Regardless, it remains the case that competition and dynamism will remain driving forces for productivity growth over time, and undue barriers to competition could prevent markets from achieving gains in efficiency and productivity. While in some specific markets, larger or more integrated firms are associated with greater investment or innovation, this does not obviate the role for policy to encourage healthy levels of competition — such as by lowering artificial barriers to market entry, avoiding poor regulatory incentives, and guarding against anti-competitive conduct. It will be important for governments to prioritise the right policy levers to achieve ‘bang for buck’ in influencing competition and business dynamism in Australian markets (figure 1.7).

- First, as a small open economy, a significant amount of competitive pressure in Australian markets comes from overseas. Contestability from foreign market entrants (either through imports or from having established foreign businesses commencing operations in Australia) is a particularly important avenue for driving competition. Trade in services is also likely to be a key area of new competition for Australian firms. As such, Australia’s relative openness to trade and foreign investment will be a key element in driving competitive outcomes (chapter 3).

⁹ Volume 5 of this report details capital spending in physical and intangible assets over the past 60 years.

¹⁰ Indeed, in some markets, such as online search services, it is likely that concentration has risen because a small number of innovative businesses have been able to serve consumers better. In those situations, concentration potentially reflects consumer gain, not anti-competitive conduct.

- Second, regulatory settings in Australian markets have the potential to influence firm behaviour to both promote competition and limit anti-competitive conduct. Policymakers should regularly review competition laws and regulations to make sure that they are fit for purpose (section 1.3). Any changes to competition laws and regulations should be guided by specific evidence of what is causing poor outcomes, what might be failing within the current framework, and whether existing regulations are sufficiently flexible to deal with emerging competition concerns. In addition, recent policy developments have raised questions about the nexus between workplace relations regulation and competition policy (section 1.3).
- Third, trends in competition and their effects on both productivity and consumer welfare will vary between industries and, as such, will require a policymakers to take a micro lens. Governments should focus on sectors where existing regulations unnecessarily impede new entrants and where various forms of government involvement (in the forms of public funding, provision, and regulation) can create less contestable and less competitive markets (section 1.4). Overall, governments should focus on sectors with significant and longstanding contestability issues — where evidence suggests consumers are experiencing poor choice, where firms face poor incentives to improve efficiency, or where there are known barriers to contestability. Governments should also be wary of creating new barriers to contestability in developing climate change policy, where technology-neutral approaches and broadly consistent pricing of mitigation can promote competition (volume 6).
- Finally, while it is important to better understand historical drivers of market dynamics, policy reform must be forward-looking. Emerging trends suggest that a number of policy levers will have a bearing on competition, many of which are discussed in other parts of the Productivity Inquiry, given their importance to productivity in their own right. A policy approach to improving competition would be incomplete without addressing the issues about the access and use of digital technology (discussed in volume 4) incentives to investment and market entry (discussed in chapter 2 of this volume and in volume 5) or the challenges of regulating platform work business models in the context of workplace relations (discussed in volume 7).

Figure 1.7 – A range of policy levers can improve competition

<p>International contestability</p>	<p>Staying open to international competition</p> <ul style="list-style-type: none"> • Australia should pursue economic resilience by harnessing open trade. (recommendation 3.7) • Import competition promotes efficiency and potentially diffusion – remove tariffs and anti-dumping; improve recognition processes for product standards. (recommendation 3.8) • FDI can provide new market entrants in industries with large incumbents – open FDI settings should be maintained; the screening regime should be designed and operated with an understanding of the potential costs of chilling investment. (recommendation 3.9) • Trade in services is likely to increase over time – Australia needs appropriate digital skills and infrastructure, appropriate regulatory settings, and facilitatory migration settings. (recommendation 3.10)
<p>Regulatory reform</p>	<p>Improving contestability and the incentives for business investment</p> <ul style="list-style-type: none"> • Reform to Australia’s broader risk protection ‘system’ could improve incentives to entrepreneurship, innovation, and mitigation. (recommendation 3.1) • Better planning and zoning regulation can allow new entrants to compete in industries where physical location is important. (recommendation 3.2) • Governments should ensure workplace relations regulation does not have unintended consequences for competition. (finding 3.2) • Governments can influence contestability where industry-specific regulation is complex and pervasive (such as private health insurance and pharmacies). (recommendation 3.3) • The tax system can be the source of distortions and poor incentives. Reforms to improve the efficiency of the tax system will be necessary in the coming decades. (recommendation 3.4)
<p>Digital progress</p>	<p>Addressing digital challenges and harnessing opportunities</p> <ul style="list-style-type: none"> • Through <i>digital dynamism</i> new entrants can more easily connect with customers online, at a national scale; horizontal platforms allow microbusinesses to test the market (e.g. Fiverr, Airtasker, Freelancer). <i>Digital disruption</i> means that platforms can provide new approaches to services and disrupt stagnant markets (e.g. rideshare, care services). Regulation should not unduly stymie new business models. (recommendations 7.18 and 7.19) • Mergers regulation must be fit for purpose, noting its complicated relationship with innovation and productivity. (finding 3.1)

1.3 The regulation of competition

While competition regulation often appears to centre on specific benefits (or costs) to a particular sector, industry, or firm, it should be noted that the ultimate objective of the *Competition and Consumer Act 2010* (Cth) (CCA) is to ‘enhance the welfare of Australians’. The focus of the Act is on competition as a means to achieve enhanced economic (particularly consumer) welfare. In practice, competition is not an action that is discretely achieved once and for all, rather it is an ongoing ‘state of play’. As explained in the ACCC’s merger guidelines:

Competition is a state of ongoing rivalry between firms — rivalry in terms of price, service, technology and quality. Market participants are mutually constrained in their pricing, output and

related commercial decisions to some extent by the activity of other market participants (or potential market participants). (ACCC merger guidelines at 3.1)

This suggests that both the design and administration of regulations should be guided by more than simple metrics — such as the number of competitors, market shares or the extent of concentration — which often provide only limited insights into the actual impact of competition on consumer welfare.

Australia has a well-functioning, sophisticated system of competition regulation, but as new products are launched and business practices evolve, it is important to ensure competition laws remain appropriate to achieve their welfare objective. Some of the key challenges facing policymakers today include the design of mergers control; regulating market power in data and digital sectors; the nexus between competition policy and workplace relations (given recent reforms to the latter); and the application of regulation to new developments in the finance sector.

Procedural improvements for merger approvals

Issues with the current system of mergers control have been raised by various parties including the regulator. While a systematic bias in the regime could be problematic for mergers control, regardless of the direction of the bias, the ACCC has argued that the current merger control¹¹ regime 'is skewed towards clearance' of anticompetitive acquisitions (Sims 2021).

This 'skew' is ultimately a function of the unique system of processes for clearing mergers. At present in Australia, a potentially anticompetitive merger can be cleared by any of three alternative procedures — an informal¹² review process by the ACCC, a formal authorisation¹³ from the ACCC, and clearance from the Federal Court. The three alternative procedures involve different legal standards and burdens of proof. For example, while an action before the Federal Court is determined on the balance of probabilities, a merger can only be formally authorised if the ACCC is 'satisfied' that it will not breach s.50 of the CCA. In practice, these differences could invite regulatory gaming by merger parties.

In part, this skew is attributed to aspects of the informal merger process that result in inadequate information and time for decision-making (Sims 2021). From a detailed ex post review of recent merger cases, the ACCC (2022c) concluded that merger parties and third parties often exaggerated certain claims (about the likelihood of new entry, expansion, or the exercise of countervailing power) and distorted or omitted critical information.

Other criticisms relate to the interpretation of the wording of s.50 by the courts. The key issues include:

- the legal interpretation of 'likely' in s.50 has been vexed in relation to whether it is taken to mean 'more probable than not' or a 'real chance'
- more broadly, arguments about future (hypothetical) states are challenging, in that they are predictive, must be based on evidence, and must meet the Court's standard of proof.

¹¹ A merger or acquisition is illegal (i.e. anticompetitive) under section 50 of the CCA if it would have the effect, or be likely to have the effect, of substantially lessening competition in a market.

¹² If the ACCC does not oppose a merger through the informal process, this protects the merger parties from legal action by the ACCC (but not from other parties). If the ACCC opposes the merger but the parties wish to proceed, the regulator may seek an injunction before the Federal Court then pursue a s.50 merger case (and prove on balance of probabilities) that merger is anticompetitive.

¹³ Merger parties may seek statutory protection from legal action under section 50 of the Act by lodging an application for merger authorisation, with an appeal avenue to the Competition Tribunal. While the merger authorisation is in force, the authorised parties will be able to acquire the relevant shares or assets without risk of the ACCC or third parties taking legal action for a contravention of section 50 of the Act.

Different responses have been suggested as a means of addressing these issues. The ACCC has previously recommended the introduction of a new formal authorisation regime that mandates notification to and authorisation from the regulator; and legislative changes that would define 'likely' in line with its use in cartel regulation (Sims 2021). With regard to the latter, some have argued that such legislative changes would not resolve confusion about the counterfactual (Cao, King and Samuel 2022) and indeed similar legislation has worked better in New Zealand in the context of clearer directions from the Court (King 2021).

Moreover, the outcomes of merger cases brought before the courts may reflect the regulator's approach to litigation as much as it does the law or process. The ACCC's use of economic theory and modelling has often been found unconvincing in the Federal Court in the context of commercial realities and statements by business representatives about their own commercial decision-making (Cao, King and Samuel 2022; Jagot 2021; King 2021). As Jagot J (2021) noted, likelihoods are evaluated in a 'common-sense commercial context'. As such, it is unclear whether the need for legislative reform would remain if the regulator were to augment its approach to litigation.

The ACCC's proposed alternative merger clearance regime would provide more power to the regulator, and could have a number of different implications for productivity, depending on the design. Mergers can provide a way to efficiently remove underperforming businesses from a market. So long as the market remains competitive, this will enhance productivity by better allocating resources. Shifting the merger regime's focus away from the 'commercial context' would risk placing more emphasis on theoretical constructs or modelling. Removing the role for the Court altogether places a great deal of power with the regulator, necessitating some other avenue of accountability.

The ACCC's most recent interim report for the Digital Platform Services inquiry did not make specific recommendations for merger reform, but noted that:

... any future economy-wide reforms to Australia's merger laws should consider the challenges involved in adequately addressing the competition effects of serial strategic acquisitions, including by digital platforms. (ACCC 2022a, p. 7)

Overall, there does not appear to be a strong case for the implementation of a new formal authorisation regime as proposed. Rather, there is likely more value in the ACCC further considering its internal merger review processes; and for government to consider how best to avoid perverse incentives across the three alternative procedures for mergers clearance. Whichever the direction of reform, the pursuit of a more functional mergers control regime will need to address contemporary and emerging challenges, but should not come at the expense of good principles of regulatory design.

The regulation of dominant firms

In Australia, the misuse of market power is governed by s. 46 of the CCA, where 'misuse' is defined as 'conduct that has the purpose, or has or is likely to have the effect, of substantially lessening competition'. This definition, known as the 'effects test' for misuse of market power, was introduced in 2017 along with other competition policy reforms recommended by the Harper Review. It significantly strengthened the regulator to not only address conduct that was undertaken for the purpose of reducing competition, but also conduct that had or would likely have that effect. However, these new powers have been used sparingly, with the first test of these laws concluding in 2021 (in *ACCC v Tasmanian Ports Corporation Pty Ltd [2021]*).

The regulation of firms with market power has received renewed attention both in Australia and internationally, in regard to data and advertising of search-related services and social media (box 1.1). The ACCC noted that it has:

... growing concerns that enforcement under existing competition and consumer protection legislation, the Competition and Consumer Act 2010 (CCA) and the Australian Consumer Law (ACL), which by its nature takes a long time and is directed towards very specific issues, is insufficient to address the breadth of concerns arising in relation to rapidly changing digital platform services. (ACCC 2022b, p. 4)

Box 1.1 – Regulation of online platforms is evolving in different jurisdictions

European Union

The proposed Digital Markets Act (DMA) would designate ‘gatekeepers’ who are providers of ‘core platform services’, which are defined as online intermediation services (e.g. online marketplaces, booking sites.); search engines; social networking services; video-sharing platforms; number independent interpersonal communication services (e.g. messaging and chat apps); operating systems; cloud computing services; and advertising services provided alongside any of the aforementioned other core platform services. The DMA sets out multiple obligations for ‘gatekeepers’, requiring the core services operated by all gatekeepers to:

- allow business users to offer their products elsewhere at different prices or conditions, and to choose the promotion and distribution channels used to reach end users
- not prevent end users from acquiring content, subscriptions, features or other items outside the gatekeeper’s core platform services
- not require business users to use or offer the gatekeeper’s identification services as a condition of using their core platform services, or to bundle any services with the gatekeeper’s core platform services.

United States

There are a number of bills under consideration in the US Congress that seek to address different issues and harms arising in digital platform markets.

The proposed Platform Competition and Opportunity Act would prohibit acquisitions by a covered platform if the business activities of the target compete with the covered platform, constitute a nascent or potential competitor, enhance or increase the covered platform’s market position, or enhance or increase the covered platforms’ ability to maintain its market position. The proposal also includes a reversal of the burden of proof, whereby the acquiring covered platform must prove the acquisition is not unlawful.

The proposed Ending Platform Monopolies Act would prohibit ownership or control of a business that creates the incentive and ability for a covered digital platform to self preference their own products and services in a way that disadvantages competitors and undermines free and fair competition. It focuses on ‘eliminating conflicts of interest’ arising from dominant online platforms concurrent ownership or control of an online platform and certain other businesses.

United Kingdom

Under reforms proposed by the UK Government, a new Digital Markets Unit within the competition regulator would designate firms based on an assessment of whether a firm has:

Box 1.1 – Regulation of online platforms is evolving in different jurisdictions

- substantial, entrenched market power in a specified digital activity (e.g. search or social media), which has particularly widespread or significant effects, and
- a strategic position in a designated activity in the market.

Firms designated with Strategic Market Status would be subject to a binding code of conduct, potential application of pro-competitive interventions (such as mandating third-party access to data or ensuring software compatibility); additional merger control requirements (including a requirement to report all transactions and potentially a merger clearance requirement for acquisitions above a specified threshold).

The Digital Markets Unit would also be empowered to impose fines of up to a maximum 10% of a firm's global turnover for the most serious offences, with further daily penalties of up to 5% of daily worldwide turnover for continued breaches.

Source: ACCC (2022b, pp. 110–116).

In its fifth interim report under the Digital Platforms Services inquiry, the ACCC made two key recommendations about the regulation of dominant platform businesses¹⁴, which also have implications for the regulation of dominant firms (box 1.2). Similar to reforms proposed in Europe and the United States, the recommendations entail legislating criteria for identifying particular businesses as 'designated' digital platforms, and making those platforms subject to mandatory codes of conduct containing 'targeted competition obligations'.

For Australia, the concurrent development of regulatory responses in multiple regions will itself pose challenges. While cooperation and co-learning will allow Australia to remain at the forefront of regulation, the divergence in regulatory approaches between major economies could ultimately cause complications for Australia and the market more broadly — proposed legislation in the United States and the European Union alone show significant differences in their treatment of acquisitions and competition (ACCC 2022b, pp. 110–116).

Regulations established in major global markets can also shape the development of the services that are offered in Australia. For example, the introduction of the General Data Protection Regulation (GDPR) in the EU resulted in many global digital service providers simply altering their service offerings world-wide. The small size of the Australian market can limit our ability to implement bespoke regulations, as service providers may simply decide that it is not worth the effort of developing a bespoke Australian product.

¹⁴ The ACCC inquiry focuses on a subset of digital platforms, which include internet search engine services, social media services, online private messaging services, digital content aggregation platform services, media referral services and electronic marketplace services, digital advertising services supplied by digital platform service providers, and data practices of both digital platform service providers and data brokers. This differs to the focus of volume 7 of this report, which addresses workplace relations issues in platform work.

Box 1.2 – ACCC recommendations for reform of digital platform regulation

In its fifth interim report under the Digital Platforms Services inquiry, the ACCC made four recommendations. The first two relate to enhanced consumer protection measures, both economy-wide (Recommendation 1) and specific to digital platforms (Recommendation 2). The remaining recommendations pertained to the regulation of competition:

Recommendation 3: Additional competition measures for digital platforms The ACCC recommends the introduction of additional competition measures to protect and promote competition in markets for digital platform services. These should be implemented through a new power to make mandatory codes of conduct for ‘designated’ digital platforms based on principles set out in legislation.

Each code would be for a single type of digital platform service (i.e. service-specific codes) and contain targeted obligations based on the legislated principles. This would allow flexibility to tailor the obligations to the specific competition issues relevant to that service as these change over time.

These codes would only apply to ‘designated’ digital platforms that meet clear criteria relevant to their incentive and ability to harm competition.

Recommendation 4: Targeted competition obligations The framework for mandatory service-specific codes for Designated Digital Platforms (proposed under Recommendation 3) should support targeted obligations based on legislated principles to address, as required:

- anti-competitive self-preferencing
- anti-competitive tying
- exclusive pre-installation and default agreements that hinder competition
- impediments to consumer switching
- impediments to interoperability
- data-related barriers to entry and expansion, where privacy impacts can be managed
- a lack of transparency
- unfair dealings with business users
- exclusivity and price parity clauses in contracts with business users.

The codes should be drafted so that compliance with their obligations can be assessed clearly and objectively. Obligations should be developed in consultation with industry and other stakeholders and targeted at the specific competition issues relevant to the type of service to which the code will apply. The drafting of obligations should consider any justifiable reasons for the conduct (such as necessary and proportionate privacy or security justifications).

Source: ACCC (2022a).

Designation of dominant firms and gatekeepers

The ACCC’s proposed reforms echo several proposals internationally that use laws that identify firms based on particular characteristics in order to apply particular regulations, prior to any proposed acquisition or other action. For instance laws proposed in the EU would involve designating dominant platforms as ‘gatekeepers’

(box 1.1). In principle, this is similar to the ‘declaration’ of access regimes in Australia.¹⁵ If Australia were to adopt an approach similar to that proposed in the EU, attention would be warranted on the institutional and procedural arrangements for designation. For example, there would be a potential conflict of interest if the authority that determined designation was also the authority that regulated the designated businesses.¹⁶

Conceptually, designating a firm as the subject of specific regulations (*ex ante* of any proposed commercial action) assumes an *entrenched* position of market power. With regard to digital platforms, there is good reason to question how entrenched any position would be in the long term, given technological progress. Historically, Facebook has not always been the most dominant social media platform (previously MySpace) and Google has not always been the most dominant search engine (previously Yahoo!). It has been argued that, because of network externalities, vertical and horizontal integration, and merger activity, this time is different and both Meta and Alphabet have entrenched dominance. However, to avoid inappropriate and unnecessary *ex ante* regulation, any designation of a business should be time-limited, either through an application for review or a specific time limit.

A further question relates to whether the *ex ante* designation proposed internationally will eventually apply to firms outside of digital platforms. If such an approach were to be adopted, either in Australia or in major international markets, it would present a significant departure in the regulatory treatment of dominant firms. It would have significant implications for innovation and competition in Australia, in part due to our reliance on large, established firms to enter already concentrated Australian markets.



Finding 3.1
Competition law reform

The reforms proposed both in Australia and internationally to enable the designation of dominant digital platform businesses raise questions about how to regulate dominant firms more broadly. If adopted, such approaches would present a significant departure in the regulatory treatment of dominant firms and would have significant implications for innovation and competition in Australia.

Similarly, emerging challenges related to digital platform markets have prompted discussion of reform to the mergers control regime. Rather than pursuing specific rules for mergers involving digital platforms, it could be more valuable to pursue improvements to mergers procedures more generally, including within the current framework, so as to address issues both in digital platform markets and the economy more broadly. Such reform should not come at the expense of good principles of regulatory design.

¹⁵ Part IIIA of the *Competition and Consumer Act 2010* (Cth) allows for third parties to share the use of certain infrastructure facilities of national significance under a regulated access regime. While services can be ‘declared’ to be subject to a regulated access regime by the National Competition Council, there are examples where infrastructure has been ‘deemed declared’ (such as rail, gas pipelines, electricity transmission networks).

¹⁶ To avoid similar conflicts, the Australian infrastructure access regime under Part IIIA of the CCA has one regulator to recommend declaration (the National Competition Commission) while another is involved in the regulation of declared businesses (the ACCC).

The nexus between competition and workplace relations

In Australia, competition and workplace relations are regulated by two separate frameworks legislated via the *Competition and Consumer Act 2010* (Cth) (the CCA) and the *Fair Work Act 2009* (Cth) (the FW Act) respectively. The separation of the two frameworks is made explicit in several parts of the CCA.¹⁷ While this separation is largely unproblematic, there are areas of potential overlap and inconsistency.

For example, the Harper Review concluded that there was an apparent conflict between sections of the CCA and industrial conduct permitted under the FW Act (Harper et al. 2015). They considered it desirable for the conflict to be resolved in a manner that promoted competition, such that businesses would ‘generally be free to supply and acquire goods and services, including contract labour’.

More recently, the emergence of the gig economy has raised new questions about independent contractors, who are often both workers and businesses. In addition, the passing of *Fair Work Legislation Amendment (Secure Jobs, Better Pay) Act 2022* (Cth) has opened up avenues for multi-enterprise bargaining, some of which will have implications for anti-competitive behaviour.

Independent contractors as workers and small businesses in the gig economy

Contractual arrangements relating to independent contractors and their clients are covered by competition law, not employment law, even where issues relating to individual contractors are similar to other workers.

As such, independent contractors are considered both as workers and as (small) businesses. With regard to collective action, as businesses, contractors are considered competitors to one another.¹⁸ Unless a competition exemption is obtained from the ACCC, independent contractors (including platform workers) who join to collectively bargain with a target business (such as a platform) could violate competition laws. Whether a collective exemption is available turns on the public interest test — that collective bargaining must be likely to result in a ‘net public benefit’ if there is likely to be a lessening of competition. The ACCC (2014, p. 3) has stated that:

The CCA [*Competition and Consumer Act 2010* (Cth)] requires businesses to act independently of their competitors when making decisions about pricing and other terms and conditions of trade. By engaging in collective bargaining participants are at risk of breaching the CCA. Authorisation of collective bargaining is a transparent process by which the ACCC may grant protection from legal action where it is satisfied in all the circumstances that the proposed collective bargaining arrangement is likely to result in a public benefit that would outweigh the likely detriment to the public arising from any lessening of competition.

¹⁷ In s. 45DD details several circumstances where boycotts would be permitted, including where their dominant purpose relates to employment matters. In s. 51(2)(a) notes that most of Part IV of the CCA would not apply to actions relating to the remuneration, conditions of employment, hours of work or working conditions of employees. So-called ‘secondary boycotts’ (which involves at least two people acting in concert to hinder or prevent third parties from acquiring goods from or supplying goods to others) are prohibited under section 45D of the CCA, and this restriction has been applied by the ACCC in regard to some trade union activity.

¹⁸ Although platform workers covered by Chapter 6 of the *Industrial Relations Act 1996* (NSW) may also have collective bargaining rights for the purpose of negotiating contract agreements — relating to contract conditions — under NSW industrial law, without requiring competition exemptions. For instance, the TWU stated that Amazon Flex drivers ‘enjoy enforceable rates of pay along with rights to dispute resolution, union representation and collective bargaining’ following a revised NSW Industrial Relations Commission determination which expanded coverage to eligible owner-drivers of vans with a carrying capacity between 1.5 and 3 tonnes (TWU 2022).

The framework was not specifically designed for some of the more common platform work situations in rideshare and food delivery, where a large number of independent contractors work for a platform on set prices and conditions, with no formal hiring or rostering processes. A dilemma in this case is that:

- **Small groups of contractors would lack bargaining power.** Unlike collective bargaining under the FW Act, there is no legal requirement for a target company to engage in a collective bargaining process following an exemption from the CCA (whereas in enterprise bargaining, there are good faith bargaining requirements).
- **Large groups of contractors are less likely to receive competition exemptions.** In the case of the gig economy, a platform may not have any incentive to engage in collective bargaining with small groups of platform workers, and there is no legal requirement for them to do so. Conversely, a large group of contractors may have the bargaining power needed to bring the platform into negotiations, but may face several legal hurdles in doing so.

These issues are discussed further in chapter 5 of volume 7.

Multi-enterprise bargaining and implications for competing firms

In December 2022, the *Fair Work Legislation Amendment (Secure Jobs, Better Pay) Act 2022* (Cth) ('the 2022 Amendments') introduced a suite of changes to the workplace relations system, including significant changes to remove restrictions on multi-enterprise bargaining. It will likely take several years before the effect of the 2022 Amendments can be assessed, particularly given that agreements already in place would not be able to utilise the changes until their next bargaining round. The *potential* costs and benefits of multi-enterprise bargaining for productivity are discussed in chapter 4 of volume 7.

Some aspects of multi-enterprise bargaining could highlight existing tensions between competition and workplace relations regulation.

For instance, one of the stated intentions of the expansion of multi-enterprise bargaining was to prompt wage growth (Burke 2022). In effect, one of the *purposes* of removing restrictions on multi-enterprise bargaining is to increase wages above the level delivered by labour market competition (albeit subject to award conditions). All else given, higher wages will tend to increase costs and consumer prices and *possibly* reduce employment in affected firms. As such, while multi-enterprise agreements may weaken potential competition based on labour costs (typically, employers can adjust those costs within the bounds of the minimum standards set out in modern awards and National Employment Standards) this is no different from the general tension that exists between competition and workplace relations policy.

Moreover, multi-enterprise agreements would not deter businesses from competing with each other in the labour market for more productive workers, in so far as employers can still offer employees wages and conditions above what is set out in the agreement (FW Act ss.202-203).¹⁹ In addition, any risk of lost competition in the labour market would be immaterial for classes of workers whose wages are relatively low and for whom wage growth had stagnated. As such, recent changes do not introduce concerns about wage suppression.

In other ways, the expansion of multi-enterprise bargaining will present new risks for competition.

A multi-enterprise agreement may act as a de-facto source of collusion, depending on the details of the agreement. For example:

¹⁹ Agreements between firms to avoid competing for staff are prohibited by antitrust law in other countries like the United States, but in Australia are outside the scope of the CCA.

- if an agreement required participating employers to set the same wages and conditions, as well as the same rates of increase, this would preclude price competition over time that might arise were any given firm to offer smaller wage increases. The degree to which this could lessen price competition depends partly on the importance of wages and conditions as a source of costs and on the coverage of the agreement for businesses in the relevant market
- if an agreement limited the ability of employers to adopt innovative employment practices — such as alternative forms of incentives and remuneration for workers, or changing the deployment of different groups of workers — then the agreement may limit innovation and competition (to the detriment of consumers). Both workers and employers have incentives to create such agreements as the gains from reduced competition can be shared across shareholders, managers and incumbent workers.

An additional complication could arise **if employers were forced to join a multi-employer agreement**. If employees within an unwilling firm apply to the Fair Work Commission (FWC) for a variation to be added onto an existing multi-enterprise agreement, then in some limited circumstances, the firm may still be required by the FWC to join an existing enterprise agreement held by a competing firm(s).²⁰ This process could lessen competition if, for example, new entrants to a market were required to adopt wages and conditions that better suit larger incumbent firms.

Some businesses have already suggested that multi-enterprise agreements could help prevent other competitors from undercutting their prices, which they argue would keep out underqualified and unsafe workers (Marin-Guzman 2022). However, this presupposes that safety regulation (including occupational licensing) is deficient — any genuine safety issues would be better addressed within safety regulation.

The remedies for these risks rest with the FWC, and in particular, their interpretation of whether a given multi-enterprise bargaining arrangement meets legislated guidelines, and whether they are in the public interest. The question of public interest would be the main criterion on which decisions on competition would be made. Given the minimal guidance in the legislation on how competition should be weighed against other aspects of public interest, it is unclear how the FWC's approach to competition issues would differ from, say, the competition regulator, or to what extent FWC decisions (which would form the basis of case law) would be consistent with the intentions of the CCA.

²⁰ The FWC can only approve a variation to add an unwilling employer and their employees to an existing single-interest agreement or supported bargaining agreement if all the legislated conditions are met. When approving a variation to a multi-employer agreement to add an unwilling employer and their employees, the FWC must be satisfied that; it is in the public interest to add the employer, the employer is reasonably comparable to other employers on the existing agreement, the employer has 20 or more employees (excluding any irregular casual employees), the employer and their employees are not on a current enterprise agreement, the employer is not currently bargaining for a single-enterprise agreement in good faith, the employer has a history of bargaining effectively with their employees and the employees are not in the general building or construction industry.



Finding 3.2

Multi-enterprise bargaining and competition

The recent liberalisation of multi-enterprise bargaining arrangements will have complex implications for competition to the extent that it involves agreements between competing businesses on a significant area of costs — wages and conditions. Some such arrangements could lessen competition or risk acts of collusion. The extent of these risks are lower where:

- wages comprise a small proportion of business costs in a given industry
- the firms involved collectively account for a small market share
- the employees involved collectively account for a small share of the relevant (potential) workforce
- firms remain able to opt for single-enterprise bargaining, individual agreements or to use awards.

It is the responsibility of the Fair Work Commission to determine when multi-enterprise bargaining will be allowed. However, it is unclear how the Fair Work Commission will weigh competition concerns against other aspects of the public interest.

Regulating financial services

The degree of competition in the financial services sector has been the subject of reform since the deregulation of the sector was completed in the mid-1980s. In its 2018 inquiry into Competition in the Australian Financial System, the Commission concluded that while financial services are dominated by large players, changes to market structure were unnecessary (and unlikely) to improve competition. Rather, policy should focus on reforms that alter *incentives* of financial service providers, bolster consumer power, and improve governance (PC 2018, p. 4).

Consumer choice in general insurance

The complexity of financial products tends to confuse, rather than empower consumers, leading them to purchase too much or too little of a financial product. This weakens the extent to which consumer choice promotes competition because consumers find it difficult to understand and compare the many facets of financial products, limiting their capacity and ability to shop around. In the case of general insurance, market research (conducted in 2014) showed that:

- Consumers frequently had some awareness of price differences and the potential savings that they could gain but their awareness did not align with the full extent of differences in the market.
- In general, ‘... there was little to no understanding of why these price differences exist, how insurance is priced, and what influence various characteristics of the insured policyholder and the property have on the final premium.’
- Understanding policy details and level of coverage was a key issue, with few knowing how to separate and interpret the different ‘fine prints’ offered by each insurer. Most admitted they did not ever read the [product disclosure statement] and of those who did, none were able to understand it given the complexity in wording and length of the document. (Fels and Cousins 2019, p. 12)

Complexity is an impediment to effective user choice and presents inherent challenges in improving competition for services like general insurance. It also creates scope for marketing to masquerade as competition. For example, while the number of retail brands (and insurance products) has grown, there are relatively few insurers underwriting those products.

- The Commission noted that the four largest insurers underwrote 30 brands of insurance (PC 2018).
- The ACCC found that in northern regions of Australia, eight insurers sell the vast majority of home, contents and strata insurance via approximately 150 brands and intermediaries.

The proliferation of insurance products with only slight variations has become a burden for consumers (PC 2018, p. 13) and make comparisons much more difficult (ACCC 2020, p. 117). And while some degree of competition still exists between brands under the same insurer, it is limited, given the insurer has the incentive to maximise profits across the portfolio of brands that it underwrites. As such, this market structure creates the illusion of more competition.

A way to improve transparency, and hence competition, in insurance markets (with relatively little cost and minimal intervention) would be to inform consumers about when they are choosing from products offered by competing insurers and not just a diverse set of products from the same insurer. There could be value, in particular, in providing more information to consumers at the point of their decision-making — both in regard to which brands are underwritten by which insurers, and (for renewals) how their new premium compares with their previous one.

Competition in banking and home loans

While aspects of Australia's banking system remain highly concentrated, improvements in competition for some personal and business banking products have occurred in recent years, including via developments in new forms of finance. The ACCC observed that:

There are some signs of increasing competition in the banking sector, most notably in home loans and international money transfers (IMT). There has also been new entry by a range of neobanks and fintechs, who are playing an increasingly important role in the market, often with innovative technology and business models and a move to a more customer-centric platform-based models. We have also observed innovation in the provision of payments services, through new technologies and use of services such as the New Payments Platform. These innovations continue to enhance productivity of the financial services delivered to Australian consumers. (ACCC, sub. 72, pp. 9–10)

In some cases, regulation has yet to catch up with developments that reduce the benefits of competition for consumers. For example, incentive structures for brokers in the home loan market, which include trail commissions and 'clawback' of commissions, create conflicting incentives (PC 2018, pp. 324–331). The Commission's findings were in line with evidence from ASIC, which found that:

This standard model of upfront and trail commissions creates conflicts of interest. There are two primary ways in which these conflicts may become evident. Firstly, a broker could recommend a loan that is larger than the consumer needs or can afford to maximise their commission payment. This may also involve recommending a particular product or strategy to maximise the amount that the consumer can borrow (e.g. through the choice of an interest-only loan). In this report, we have referred to this as a 'product strategy conflict'. Alternatively, a broker could be incentivised to recommend a loan from a particular lender because the broker will receive a higher commission, even though that loan may not be the best loan for the consumer. We refer to this as a 'lender choice conflict'. (ASIC 2017, p. 10)

These structures — with their associated reduced benefits of competition for consumers — remain in place, following the abandonment of a slated ACCC review.

1.4 Competition, dynamism and the expansive footprint of government

In a number of industries, regulatory restrictions and other government interventions are themselves the cause for limited contestability or poor incentives for efficiency. In a number of parts of the economy, government interventions — either deliberately or inadvertently — have the effect of lessening exposure to risk, which in turn, can lower incentives for business dynamism and productivity growth, as well as for individual risk taking and entrepreneurship. Positioning these parts of the economy for future productivity growth might then require changes to the underlying incentives that businesses and individuals face to offset the lack of competitive market pressures that would otherwise have motivated service provision, for example, that is responsive to consumer demand, or innovation in processes that is responsive to a threat of market share loss.

Improving risk management and insurance

Though not recognised as such, Australia has a ‘risk protection system’, consisting of voluntary private insurance (including health insurance, life insurance and general insurance for property damage), mandatory contributory insurance schemes (such as workers compensation and compulsory third party insurance) and the publicly funded social safety net (unemployment benefits and pensions) and in-kind insurance (Medicare, public housing, NDIS and aged care).

There are also a range of regulatory safety nets — most notably Australia’s industrial awards system.

All are characterised by significant government involvement, via the regulation of private insurance, the mandating and often public underwriting of universal contributory schemes, or the direct funding or delivery of government programs. These elements have developed by increment and without holistic design.

The scale of these broad forms would be substantial, considering that social insurance not only combines elements with an explicit risk-management focus like private insurance, but also those with a strong focus on redistribution like pensions and income support.

Risk protection has benefits: people value extra income more in bad times than in good. Nonetheless, this ad hoc ‘system’ of risk protection and insurance lacks coherence and arguably has become a potential barrier to innovation and productivity growth on a range of fronts:

- gaps in risk protection can **reduce risk appetite** (such as diminishing willingness to change career or start a business), which could reduce the dynamism of the economy
- the transfer system can **create adverse work incentives**, affecting labour supply
- regulatory restrictions on private insurance can **prevent new approaches** to prevention, and more efficient service design, thereby limiting innovation and more productive options
- publicly funded programs do not always embed strong disciplines around insurance principles like **maximising long-term outcomes and cost containment**.

Unlike the retirement savings system, which has a recognised architecture, the risk protection system in Australia is not well understood. Its complex inter-linkages have not been systematically examined.

Steady and evidence-based reform in this area could yield substantial long-term gains for innovation, productivity growth and better outcomes for individuals and firms.

The best approach is to address known problems and inefficiencies in the near term, combined with a broad ranging, generational review into Australia’s social insurance system to achieve better coherence and test its robustness to new forms of risk affecting the modern economy.

Some of the issues that a review would assess, and on which near term reforms could start to make progress are: the impact on entrepreneurship; barriers to innovation; and poor incentives for mitigation.

The impact on individual entrepreneurship

Australia and New Zealand are outliers in following a ‘social assistance’ approach to income replacement in the event of job loss. This model involves access to uniform, means tested payments funded through general taxation. Most OECD countries operate contributory unemployment insurance schemes with eligibility and benefits influenced by prior income and individual contributions.

One consequence is that many households in Australia and New Zealand can face larger falls in short-term income in the event of job loss than is typical in other OECD economies.

There is no inherent superiority associated with the unemployment insurance arrangements prevalent in other developed economies. They can be costly and — because funded through contributions — involve an increased ‘wedge’ between the wages employers face and an employee’s take-home pay. They are also, by design, less progressive (that is, redistributive) than the Australian and New Zealand models.

It is noteworthy, however, that during the COVID-19 pandemic, policy changes included a temporary increase in Jobseeker (the means tested income support payment) and giving households access to a portion of their accumulated superannuation balance. These features arguably mimic aspects of a contributory scheme, albeit after the economic shock occurred.

These developments add weight to the case for holistic review. An important question is the extent to which greater protection against income loss could better support workers affected by economic transition (e.g. through structural change) and reduce any undue risk aversion created by existing arrangements.

A review could also consider what options Australia has to improve short-term ‘replacement rates’ via mechanisms that go beyond self-insurance but stop short of radical change like a full-blown unemployment insurance scheme. Any of these possibilities have to be weighed up against the capacity for governments to flexibly fund public insurance through taxes and to spread these costs over generations through debt.

Existing life insurance through superannuation provides some income protection in the event of illness and injury. Other forms of idiosyncratic income loss (e.g. through loss of a job) are hard for private insurers to underwrite. But there may be some scope for incremental expansion of income protection where the pool is large (as with group insurance through superannuation) and ‘moral hazard’ and adverse selection issues can be contained. Greater use of income contingent loans — a well-established system for recovering up front education costs — could also be part of a broader suite of instruments to provide protection against loss of income with some element of risk pooling.

Of course, in the face of a large-scale shock, such as a pandemic or substantial economic downturn, the government will tend be the lowest cost insurer, with its ability to pool risk across the whole community and across time.

Barriers to innovation and new service models

Private insurers are heavily restricted in the services they can offer to members, which in turn limits potential innovation and more productive approaches.

Private health insurance is a heavily regulated product with a highly restricted domain (box 1.3). Hospital cover pays for aspects of private hospital episodes (accommodation, theatre fees and clinician gap payments), while ancillary cover can pay for out of hospital treatments that are not eligible for Medicare Benefit Schedule rebates.

The burden of disease has shifted towards noncommunicable disease and chronic physical and mental health conditions. Hence the health system as a whole is needing to put greater emphasis on the avoidance of hospital admissions through prevention and supported self-management. This includes, where possible, helping people to remain active in the community and workplaces.

In principle, private health insurers are well positioned to play an active role in facilitating innovative models of care to improve prevention and long-term outcomes. Two barriers stand in the way.

One is the risk equalisation arrangements that underpin community rating. As noted in *Shifting the Dial*, ex post risk equalisation can greatly diminish the dividend to insurers from preventing ill health among their membership, as a significant portion of the savings can be redistributed back to the overall equalisation pool. This has been noted in submissions to this inquiry.

The second is the restriction on out of hospital services. While insurers are permitted to fund services that are deemed a 'hospital substitute', submissions to this and past inquiries have consistently noted the challenges in ensuring the regulatory definitions of hospital substitute treatment keep pace with emerging trends — including the tendency for services once provided exclusively in hospitals to be delivered in a range of other settings. More generally, as one submission contended:

... funding services in a community setting rather than in a hospital will reduce the incentives to medicalise treatment. (Bupa, sub. 69, p. 8)

A broader regulatory remit, along with targeted reforms to risk equalisation, could open up new options for innovation. For example, in the Mental Health inquiry, the PC recommended that health insurers should have the discretion to fund out of hospital services that lower the likelihood of hospitalisation.

Options to reform risk equalisation can be targeted, as noted in *Shifting the Dial*, and need not amount to a move to ex ante equalisation (on the basis of objective attributes of a fund's membership). One modest reform would be the ability to exempt identified prevention programs and their impacts from the equalisation pool.

As the Commission found in its case study on innovation in care for chronic health conditions, one of the barriers to experimentation and new models of care is funding models for primary care that lock in fee for service reimbursement with a pre-determined service model (such as the one-on-one, real-time consultation). In principle, private health insurers could be well positioned to contribute to more innovative reimbursement models that pay on value rather than labour input.

There are also silos between health and life insurance. As with private health insurance, life insurers play a key, but restricted, role in Australia's health care system. Life insurers, via their income protection policies, have a strong incentive to maintain the health and wellbeing of their members, particularly with emphasis on facilitating a return to work.

Life insurers can provide rehabilitation focused on return to work, but cannot provide benefits that might otherwise be insured by a private health insurer (or that would be eligible for Medicare rebates).

It is an open question whether the silo between life insurance and private health insurance, created by regulation, stands in the way of more innovative and efficient options to improve outcomes at low cost. A key concern could be that private health insurance is a community rated product, whereas life insurance is either individually underwritten or community risk rated on the basis of the population served through group insurance via superannuation (which will tend to be younger on average than the private health insurance pool). But there may be scope for incremental expansion of both life and health products to fund evidence based preventative interventions.

Life insurers could have greater scope to fund (as distinct from promote) evidence-based early intervention and self-management options.

Mental illness is one area where the role of health and life insurance, as well as workers compensation, could be expanded and/or clarified. The rising salience of mental illness has challenged the traditional roles and definitions of aspects of our (public and private) social insurance arrangements. In particular, the cost of mental illness in workers compensation schemes has risen, just as the risk of physical injury at work has diminished over time.

Workers compensation schemes are no-fault (i.e. do not rely on establishing negligence on the part of employers) but generally require that injuries or illness occurred at or due to work. This can be complex in relation to mental illness, such that claims can be contested for lengthy periods. The PC's Mental Health inquiry recommended no-liability early intervention in respect of psychological services, even if a claim for income replacement was still pending.

There is an overlap with life insurance. Past submissions to the PC have noted that life insurance pays out benefits to members suffering mental illness and where the workplace has been a contributing factor, among others. It is not uncommon for claims to be pursued via workers compensation first and later with life insurers if unsuccessful.

Whether this division of labour is optimal, and sustainable, for both forms of insurance, is an open and important question. The funding mechanism can look similar — much life insurance funded via superannuation (ultimately from contributions) while workers compensation is funded through levies on firm payrolls. The important question is where risks are most efficiently borne and who can most effectively drive which preventative actions (life insurers with their members and/or work health and safety regulators with employers and workplaces).

Poor incentives for mitigation and early intervention

Aspects of the social insurance system take the form of government funded and delivered programs and services. As noted above, many have an explicit focus on redistribution, but many also reflect risk management motives.

Government programs do not always fully embed an insurance mindset — that is, a strong discipline on reducing long-term costs through targeted early intervention and better outcomes. The PC's work on Veterans' support indicated a system that was complex, unresponsive and too inflexible to achieve optimal long-term outcomes for clients. Similar characteristics were observed in disability services prior to the NDIS.

Australia and other jurisdictions have trialled a range of options to try and embed greater focus on long-term outcomes and costs, including New Zealand investment approach, social impact bonds in Australian states and actuarial assessments of long-term costs associated with cohorts of income support recipients. In areas like primary health care, as noted above, funding models are often a barrier to innovation, as they lock in a particular configuration of service delivery.

Not every government program is necessarily amenable to an insurance approach. But many are, given that risk protection is often the underlying rationale for government involvement. Targeted expansion of the use of an insurance approach could unlock substantial productivity gains in traditionally 'hard' areas of service delivery. This could be an important element of a far-reaching review of the overall social insurance system.

In general insurance, there have long been calls for greater investment in up front mitigation rather than disaster relief after the event.

In its 2015 report on Natural Disaster Funding and 2009 report on Government Drought Support, the PC recommended a shift of relative funding effort towards up front mitigation and resilience building. The Government's recently announced Disaster Ready Fund is a good example of this renewed emphasis on prevention.

Rigorous selection of projects and evaluation of the program could help identify where up front public funding can have the greatest impact in reducing the damage caused by natural disasters. It is possible that such approaches, including options co-funded with the general insurance industry, could help deal with other risks more efficiently.

A broad ranging review could bring into play insurance concepts that tend to be misunderstood or de-emphasised in many policy settings, like moral hazard, adverse selection, risk management and the respective roles of pooled and self-insurance options.

In the near term, some smaller steps could be taken to improve aspects of the system and unlock productivity gains.



Recommendation 3.1

A generational review and reform process for Australia's risk protection 'system'

Government could commence a broad review of Australia's risk protection and social insurance arrangements, focusing on:

- encouraging individual entrepreneurship
- removing barriers to innovative service models by insurers
- fostering efficient mitigation and early intervention.

In the near term, incremental gains could be made by progressing:

- abolition of stamp duty on insurance premiums
- continued incremental expansion of the range of out of hospital services that private insurers can fund
- targeted exemptions from risk equalisation for innovative, evidence-based preventative initiatives by health insurers
- greater flexibility for life insurers to fund (on a discretionary basis) some approved health-like services, particularly in areas like mental health
- increased sharing of government held or funded data, particularly data collected through health providers (recommendation 4.4)
- continued exploration of the 'insurance approach' in government programs through measures such as payment by results, social impact bonds, actuarial evidence and innovation funds.

Box 1.3 – Regulatory arrangements in private health insurance

Private health insurance is subject to significant regulation and public subsidy. The extent of government involvement in the sector reflects the role that private health insurance plays alongside Medicare in the funding and provision of health services.

For private health insurers, prices and profitability are highly dependent on policy settings. Tax incentives influence consumers' choices to purchase health insurance, particularly at younger ages. Premium increases require ministerial approval. And premiums are subject to community rating, in contrast to other types of insurance that are 'risk rated' and influenced by personal circumstances, demographic factors, or past experiences.

While a competitive market exists in name Australia's unique regulatory framework means that some of the efficiency gains that might be expected in a competitive market are not realised in practice. BUPA

Box 1.3 – Regulatory arrangements in private health insurance

noted that despite the existence of a ‘substantial number’ of large funds in the Australian market, competition is ‘stifled’:

... by the legislative framework that requires a process of a single, annual premium increase for health funds approved by the Minister for Health. This limits flexibility in adjusting price throughout the year, both in response to consumer demand and competition. Furthermore, the single annual increase requires funds to hold additional capital to account for changes in market conditions that, in other sectors, would be addressed by adjusting price. This additional capital could otherwise flow through to consumers in the form of lower premiums. (BUPA, sub. 69, p. 13)

Moreover, the personal income tax incentives for private health insurance mean that overall, consumption of private health insurance is not linked to the quality of service provided by the industry collectively. Indeed, some consumers may hold onto private health insurance despite reductions in value-for-money or quality of service — effectively rewarding poor service — simply in order to retain the Lifetime Health Cover protections. While some suppliers may provide high quality services, the incentives to improve efficiency, which might otherwise exist in a more competitive market setting, are dampened.

Regression analysis covering the period 2010–2017 found a decline in technological change for several Australian insurers, resulting in declining productivity growth (Nguyen 2021). Nguyen also found that firms varied in terms of efficiency, with a U-shaped relationship with firm size.

In terms of outcomes for consumers, value for money has been questionable. The Grattan Institute noted that the ratio²¹ between claims and revenue tended to vary considerably between providers — as a benchmark, some ratios were similar to or below the minimum ratios legislated in the United States (Duckett and Moran 2021, p. 22).

While a decline in the demand for private health insurance would place more pressure on public finances, so too would many of the solutions suggested by industry, including increased targeted subsidies and tax exemptions (David 2019). Others have called for greater scope for insurers to provide discounts to customers, including to encourage good health choices (BUPA, sub. 69, p. 13), which would potentially test community rating principles. Other settings, such as the governance of prosthetics pricing, is outside the control of private health insurers themselves, but has significant bearing on their provision (Duckett and Moran 2021, p. 18).

Reducing location-related restrictions on competition

As noted above, the growing use of e-commerce and tele-services could significantly reduce geographic barriers to competition over time.²² However, location remains an important factor for businesses that rely on a physical presence: proximity between businesses and their consumers can influence market share, and barriers to viable locations can be a barrier to entry in a number of sectors. Most of these restrictions are contained in state/territory/local government planning, zoning and development assessment arrangements. In what appears to be a minority of industries, there are also industry-specific government regulations that restrict business location, and hence, competition.

²¹ This ratio averaged about 86% prior to COVID-19, rising in 2020 likely due to the effect of COVID-19.

²² ABS, Retail Trade, Australia.

Urban planning and competition

The availability of viable locations and sites for particular types of business activities can influence market entry in some sectors, with direct implications for business dynamism and competition at the local level.

Depending on the type of business, what is a viable site may entail consideration of the site size, accessibility, or proximity to other businesses, consumer populations, infrastructure or logistics networks. Scarcity of sites with particular characteristics is, to some extent, unavoidable in urban areas. In some cases, commercial constructs can also influence the availability of such sites — commercial leases have previously been shown to guard against the introduction of new competitors.²³

More broadly, planning and zoning regulations at the state and territory level have proven to be a significant lever for facilitating (or restricting) market entry. Such regulations usually exist to deliver agreed social outcomes — such as public health and safety, or environmental amenity — but are often very prescriptive rather than outcome oriented in their specification or implementation and thereby may unduly restrict the setup of particular types of business. This can impede new entrants, or limit scope for existing businesses to experiment with different service offerings. For instance, opening a supermarket in a vacant warehouse in a ‘B6 Enterprise Corridor’ in Sydney would involve a planning proposal to allow an additional type of use for that zone, typically adding 12–18 months to the process (PCNSW 2020, p. 240).

Broader structural trends in some product and service markets — the rapid growth in online retail and the increased feasibility of more people working from their homes, for example — highlight the need for some flexibility in Australia’s planning and zoning systems. In many areas, these trends are contributing to the increasing need for delivery and warehousing in urban areas (given growth in both e-commerce and urban density), and a shift away from manufacturing and other industrial occupations, and towards knowledge-based occupations in urban centres.

The competition for viable sites is likely to affect competition in some burgeoning secondary markets, particularly in urban areas. For instance, the transition to low emissions vehicles has already seen significant private investment into electric vehicle charging stations — the need for stations at various locations will depend on factors including uptake, charging times, and proprietary technologies. Indeed, as multiple vehicle technologies enter the market (potentially including battery-swapping and hydrogen charging) the ability to establish convenient refuelling networks will have significant implications for competition in the vehicle market. (Climate change transitions are discussed more fully in volume 6).

Reforming planning and zoning

While some progress has been made to improve planning and zoning across all jurisdictions, further improvements should be prioritised.

Reforms to planning and zoning laws in Victoria in 2013 and 2018 are a useful example, in that there are relatively few commercial and industrial zones; the zones are standardised and have a broad range of allowable uses; and many commercial uses are as-of-right. The reforms were largely found to reduce set-up costs and increase the availability of suitable sites for particular businesses (such as small-scale supermarkets and large format retailers) improving competition (PC 2020d). Broadly these experiences support the idea that business zones should be as broad as possible (as noted by Harper et al. (2015) and the Commission (2021b)).

²³ Across 2009 and 2010, the ACCC reached agreements with all major supermarket chains operating in Australia that they would not enter into any new leasing agreements that include restrictive provisions, nor would they enforce any restrictive provisions in current leases beyond five years after the commencement of trading. Signatories included Coles Group Limited, Woolworths Limited, ALDI Foods Pty Ltd, Franklins Pty Ltd, SPAR Australia Limited, Australian United Retailers Limited, and Metcash Limited.

Where planning regimes are more agnostic to uses, and zoning is broader, this also avoids the need for rezoning processes. Current rezoning processes often involve consideration of the effects on incumbent businesses, including from increased competition. To this end, Harper (2015, p. 45) recommended that planning decisions should not be adversely influenced by the potential for competition between individual businesses, nor by the impact on the viability of existing businesses; and that restrictions should not apply to the number of a particular type of retail store in a local area, nor the proximity of particular types of retail stores to each other. Similarly, the NSW Productivity Commission (2020) noted that there is a strong case to consolidate a number of business and industrial zone categories²⁴ into a single zone that allows ‘a mix of business, light industrial, creative industrial, and retail activities’ (p. 241).

The Commission (2021b) has previously suggested improvements could be made by pursuing administrative efficiency, including by aligning plans at different levels of government; and addressing simpler applications outside of the assessment process. Key reform areas relevant to competition include:

- **Move to fewer zones with broadly-stated allowable and as-of-right uses.** A small number of commercial and industrial zones (2–3 respectively) — with a wide range of allowable uses — provide flexibility, certainty, and competition, and limit the need for significant spot rezonings. Prohibited uses are kept to a minimum and most uses are as-of-right.
- **Standardise permissible land uses within zone types.** Zone definitions are as common and as consistent as possible across the state, and usually embedded in state government instruments, to provide clarity and certainty as to allowable land uses.
- **Create defined and efficient processes for rezoning applications.** To the extent that rezoning or planning scheme amendments are required to progress a development proposal, states ensure there is a clear process for applicants to pursue, with expected timeframes, criteria and appeal rights.

These reforms should be considered in the context of the overarching objective of balancing commercial, industrial and residential uses of urban land. The Commission’s (2022e) recent inquiry report on *The National Housing and Homelessness Agreement* considered how planning and zoning regulations restricted the supply of residential land and the implications for the supply of housing. Some empirical research suggests that zoning restrictions add significantly to the cost of both apartments and free-standing homes in Sydney (Kendall and Tulip 2018; Jenner and Tulip 2020), although it is difficult to accurately estimate these effects in part because regulations change over time and vary in terms of how binding they are on planning activity (Phibbs and Gurran 2021). On balance of the evidence, the Commission has noted that restrictive planning and zoning regulations can pose significant and unnecessary costs, and recommended revising planning and zoning to achieve greater density (box 1.4).

Further liberalisation of residential planning controls, including greater allowance for mixed land use, stands to support productivity growth through several channels, including an increase in dwelling services for each unit of scarce urban land, an increase in agglomeration benefits, and a reduction in transport times between households and businesses. It may also better position Australia’s housing market to respond to increases in demand associated with Australian population growth, which stands to be an important channel for productivity growth over the years ahead (chapter 1 of volume 7). This will likely include ensuring a diversity of housing stock, which could further support potential changes in the composition of Australia’s migration program over time, and support increased geographical mobility of labour more generally.

²⁴ B5 (Business Development), B6 (Enterprise Corridor), B7 (Business Park) and IN1 (General Industrial).

Box 1.4 – Planning and zoning in the National Housing and Homelessness Agreement

The Commission's (2022e) recent inquiry report on The National Housing and Homelessness Agreement found that:

There is no one-size-fits-all solution to achieving greater density, because the restrictions that constrain supply will be different in each jurisdiction. Any changes to zoning regulation should balance the benefits of additional supply against costs to the environment, amenity and liveability of cities. The changes should also be supported by existing or proposed infrastructure, public transport, community facilities and access to jobs. But a good starting point to encouraging greater density in residential zones would be to:

- review zoning rules that allow only single detached houses
- allow more dense development 'as of right' along key transport corridors, with height limits set up front
- relax regulations limiting the use of secondary dwellings
- relax minimum carpark requirements for developments where there is good access to public transport
- relax minimum floor sizes. (Finding 13.2, p. 514)

The report recommended that:

States, with their local governments, and Territories should revise their planning regulations to promote greater density to meet demand for well-located housing in established suburbs and locations with good access to jobs, services and transport.

States, Territories and local governments should also revise planning regulations to facilitate greater housing diversity, including low-cost or innovative housing types.

(Recommendation 13.2, p. 514)



Recommendation 3.2

More flexible and streamlined planning and zoning

State and Territory Governments should revise their planning regulations to ensure residential, commercial and industrial zoning is not unduly restrictive. This should include:

- implementing standardised business, and industrial zones across local government areas
- aggregating existing business and industrial zones to reduce the number of zones where possible and to broaden the range of permissible activities
- ensuring that urban planning decision-making processes consider the introduction of competition to incumbent businesses as a positive outcome.

Industry-specific restrictions on location

There are relatively few instances where governments actively restrict the location of businesses in a particular industry. Typically where this occurs, it is to minimise adverse social outcomes expected to be associated with a particular activity, given vulnerable populations or environmental assets to be protected. In

the case of gaming machines, for example, some states (such as Victoria) cap the number of machines in their state or in regions within the state, in order to limit gambling opportunities in vulnerable communities (Victorian Government nd).

The location restrictions that governments apply to retail pharmacy, however, stand in stark contrast to this. Rather than restricting an activity that could be expected to have an adverse social or environmental outcome, the Government restricts the location of a business that contributes to community health and wellbeing, and thereby limits the scope for getting improved outcomes for consumers.

Retail pharmacy is subject to a specific set of regulations regarding market concentration. At the Commonwealth level, the Pharmacy Location Rules regulate where retail pharmacies can operate, ostensibly to 'ensure a well distributed geographical spread of pharmacies across Australia'. At the state and territory level, the ownership of pharmacies is regulated — in most jurisdictions, regulation stipulates that only a registered pharmacist (or a family member) can own a community pharmacy, and restrictions apply to the ownership of multiple pharmacies that are located near each other. Such rules have not been unique to Australia, although several countries such as the United Kingdom and United States now allow pharmacies to be co-located with supermarkets.

Both sets of regulations dampen competition in retail pharmacy and the costs are borne by consumers (AMA 2021; King, Watson and Scott 2017; PC 2015). As noted by the Review of Pharmacy Remuneration and Regulation:

The Pharmacy Location Rules have not established robust competition between independent pharmacies in some locations. Rather, in some locations, either individual pharmacists or small groups of pharmacists have been able to monopolise some or all pharmacies. This is inconsistent with the objective of Australia's competition laws. (p. 19)

At the same time, parts of the regulatory framework are often ineffective in delivering other intended benefits.

- Setting a minimum distance between pharmacies does not support community access to pharmacies (including in rural and remote communities); and consumer safety would be better protected by regulating conduct, rather than ownership (PC 2015, pp. 53–54).
- The rules may not have effectively safeguarded community ownership as intended. While almost all pharmacies are *owned* by pharmacists²⁵, major pharmacy operators have 'effective franchise agreements with differing levels of control over the franchisee'²⁶. And in 2018, the four major operators were estimated to have 73% of market share (KordaMentha Restructuring 2018, p. 8). This level of concentration does not appear to be harmful to consumers — rather, it exemplifies that ownership restrictions contribute little benefit if any. Indeed, to the extent that such laws restrict the number of pharmacies, they are more likely to lessen competition.
- While the regulations attempt to improve accessibility, there are fewer pharmacies per head of population. When the location and ownership rules were introduced, the population-to-pharmacy ratio was 3000 people per pharmacy — this increased to an estimated 4365 in 2014 and 4426 in 2022 (Chemist Warehouse 2016).

Current regulations that have the stated aim of reducing market concentration are likely to instead reduce competition and establish local monopolies, with little countervailing benefit. These impediments to competition are purely due to the regulatory framework and should be changed by governments immediately.

²⁵ All pharmacies are owned by pharmacists with the exception of a small number owned by friendly societies under grandfathering of previous legislation (Sub. no. 112, Pharmacy Guild of Australia, p. 2).

²⁶ KordaMentha Restructuring (2018, p. 8).

There are broader questions about the role of pharmacists alongside other health professionals, and whether reform is warranted regarding scope of practice (discussed in volume 7).



Recommendation 3.3

Improve competitive pressures in highly regulated sectors

The Australian Government should remove impediments to competitive pressures in sectors where it has a substantial regulatory footprint. In the first instance, this could include:

- as part of a broad review of Australia’s risk protection and social insurance arrangements (recommendation 3.1) assessing regulatory arrangements in private health insurance and their implications for competition, health outcomes and productivity
- removing anti-competitive regulations on the ownership and location of pharmacies.

Other sectors where the Government has a large regulatory footprint should similarly and subsequently be examined to remove any impediments to competitive pressures that are not supporting a broader social or environmental policy objective.

Improving outcomes in publicly-funded and provided services

Governments can play a central role in promoting quality, accessibility, and efficiency in the delivery of non-market services. They have an ongoing role in making sure services work together towards the intended objectives, particularly for consumers of the services. The Commission has previously commented on governance arrangements and service delivery in a range of publicly funded services.

- The potential to promote efficiency in health services is discussed in full in the Commission’s (2021a) information paper *Implementing Innovation Across the Health System*.
- The Commission has previously identified that the social housing system in particular is an area requiring reform. A suite of policy recommendations were made in the Commission’s Housing and Homelessness Agreement Review (PC 2022e).

Competitive markets in human services

Competition and contestability in markets are a means to an end — improving the effectiveness of service provision for consumers. In the past decade, some competition and user choice have been introduced to improve delivery of publicly-funded human services, with many now delivered by a mix of public, private and non-profit service providers. While competitive pressures in markets can help to improve the efficiency with which services are delivered, they have their limits in achieving social welfare outcomes, particularly in regions with a sparse population and few services available over which consumers can exercise choice. As noted previously by the Commission:

... greater informed user choice, competition or contestability will not always be beneficial, and not all areas of human services are amenable to these mechanisms. The costs and benefits of a reform option depend on the characteristics of the people accessing the service, the characteristics of the service itself and the market conditions where service providers and users interact. (PC 2017b, p. 64)

To the extent that competitive pressures do not create the incentives needed to improve quality and efficiency in the delivery of a particular human service, there is a clear role for governments to use policy and

regulatory frameworks to achieve social and efficiency objectives. To this end, there are a number of potential areas of productivity-enhancing reform in human services.

First, reforms to policy and regulation can aim to improve incentives for service providers.

- Consumer protections often focus on input regulation, dulling service provider scope to alter inputs in order to improve either efficiency or quality of service deliver. While licensing and registration are often indispensable in human services (in particular, with regard to criminal histories and working with vulnerable people), complementary measures that focus on outputs are often underutilised (discussed in volume 7).
- One of the key productivity benefits of competitive markets is that they can provide incentives for businesses to innovate and adopt best practice. In the absence of such incentives, the frameworks through which services are funded and regulated can be used by governments to encourage innovation. A number of potential improvements to the delivery of health and human services are discussed in volume 5.

Second, there is scope to remove complexities between different schemes and programs across human services to more readily enable providers to offer their services in multiple markets. For instance, allied health providers operating under different federal government schemes face duplication in compliance burdens by having to register with each scheme. Providers are also paid different amounts for similar services under the different schemes. There is likely scope for a more coordinated approach to administration and pricing.

Third, there may be a number of practical ways to facilitate more user choice. With regard to aged care, Yong et al. (2020) argue that private sector involvement alone may not improve outcomes in practice, as:

... even with perfect information on prices and quality, consumer choice is often restricted to local areas since most consumers only search for aged care services around where they live.

Competition in aged care is localised, meaning that providers enjoy substantial market power if there are few competitors in the local market. (p. 3)

In some cases, digital platforms can give consumers more choice in some aspects of service delivery, for example where they facilitate a more user-centric model of service delivery. However, the presence of digital platforms alone is unlikely to substantially increase the number of available workers in a local area.

Fourth, a key barrier to competition in some areas of human services is labour supply. The lack of suitably qualified workers is a barrier to competition and quality of service in the care sector, particularly in less populated locations. Labour supply in care occupations is influenced by both wage and non-wage factors. A number of policy levers could be used to address labour shortages, and thereby, competition in the care sector.

- Pay and conditions are likely to be influential in attracting and retaining workers in human services.²⁷ The certainty and timing of payment may also be important, given that individual care providers can reportedly face delays in receiving their payments, even where the services are fully funded.²⁸

²⁷ In aged care, for example, the Royal Commission into Aged Care Quality recommended increases in award wages and other remuneration, and in 2022, the Fair Work Commission determined a 15% increase to wages in those awards.

²⁸ The Payment Times Reporting Scheme requires large businesses and large government enterprises to report their small business payment terms and times (Treasury nd). Delays can occur in providing payments to service users, who then have the autonomy to arrange payments to providers, as per the user-centric model. This can occur for several reasons, including where clients have exceeded their allocated funds, or due to timesheet processing. There are potentially a number of different ways to improve the timeliness of payment without removing user autonomy — for instance, payments could be subject to a bulk-billing function similar to Medicare. Delays in government-provision of payments could be subject to transparency mechanisms, as is the case with government enterprise payments to small business.

- Governments are responsible for ensuring adequate funding of human services. To the extent that services are funded from an efficient tax base, this will reduce the marginal excess burden associated with service provision, hence making funding levels more sustainable.
- To some extent, the supply of labour will continue to depend on migration policy settings (discussed in volume 7).

The Commission recently concluded that platforms in aged care can play an important role in filling the work needs of the sector, in part because some workers prefer the flexibility associated with platform work, while users often benefit from greater choice of in-home care (PC 2022c). In order to derive ongoing benefits from platform work in human services delivery, governments will need to ensure that platform work is appropriately regulated (discussed further in volume 7).

Competition with government business enterprises

Governments can contribute directly to more competitive and dynamic markets by ensuring that their own government business enterprises (GBEs) do not enjoy competitive advantages by virtue of public ownership that effectively stymies the activities of private sector competitors. The regulation of competitive neutrality plays a significant role in a relatively narrow set of industries (where GBEs face competition or the prospect of competition). Despite this, competitive neutrality has potentially material implications for productivity.

First, GBEs tend to operate in industries that were historically networks with natural monopoly characteristics, but were increasingly open to competition (often as technology progressed and the economy grew in sophistication). This includes NBN Co, Australia Post, Moorebank and some urban passenger transport (states and territories). These industries provide infrastructure or inputs relatively broadly across the economy.

Second, competitive neutrality deals with aspects of competition that make a material difference, particularly given the size of the GBEs and their competitors. Issues of debt neutrality in particular (where GBEs have access to finance on favourable terms) can amount to material advantages. This not only has implications for competition in those industries, but as is the case with other forms of industry assistance, it would have distortionary effects on investment generally.

In its recent investigation of a complaint against NBN Co, the Australian Government Competitive Neutrality Complaints Office (AGCNCO) made recommendations relevant to competitive neutrality in the broad, including that Treasury develop guidance material on:

- how to calculate the cost savings associated with an implied guarantee of lease agreements
- how to calculate the difference between the actual and benchmark cost of debt where no direct market data are available
- how to avoid excessive compliance and administrative costs in setting and collecting debt neutrality adjustment payments for line-of-credit type debt
- how to calculate the cost savings associated with unpriced loan extensions and the premature payout of fixed-term loans
- how businesses should select a value for the 10-year bond rate under the risk broad-banding approach for setting a benchmark commercial rate of return on assets, as specified in the Australian Government Competitive Neutrality Guidelines for Managers
- the appropriate risk premium level to assign to a low-, medium- or high-risk assessment under that broad-banding approach. (PC 2022a, p. 20)

A broader question for Australian governments is whether the regulation of Competitive Neutrality is still fit for purpose. Typically, competitive neutrality is not enforceable in a court of law — recommendations are

provided to ministers and treated as a matter of public policy. Such recommendations are routinely ignored at the state and commonwealth level.

The Harper review recommended a review of competitive neutrality. One such review was initiated at the Commonwealth level in 2017, but was not completed. Similar reviews were initiated and abandoned in some states. Only New South Wales is continuing to undertake its review of NSW competitive neutrality regulations (undertaken by IPART).



Finding 3.3

Increasing government involvement in some sectors can have implications for competition

Governments can play a central role in promoting quality, accessibility, and efficiency in the delivery of non-market services, particularly where they are able to:

- improve incentives for service providers, while removing complexities between different schemes and programs across human services to more readily enable providers to offer their services in multiple markets
- avoid locking in traditional provision models that inhibit innovative options, particularly in areas where markets are thin or labour is hard to attract
- be vigilant about the unintended consequences for competition in markets where government business enterprises operate.

2. A better environment for productive investment

Key points

- ✳ **Efficient investment and productivity go hand in hand. High multi-factor productivity growth can stimulate investment. Ideas and innovation are often embedded in new capital.**
 - Low investment can be a symptom, as much as it is a cause, of low productivity growth.
- ✳ **Australia's business investment as a share of GDP has declined relative to its long-run average in Australia, as it has across a number of advanced economies. This likely reflects both structural and cyclical factors.**
 - Overall business investment levels do not appear to have been particularly responsive to declining costs of capital. It is unclear whether the apparent rise in risk premia during a period of unconventional monetary policy will be sustained as risk free rates normalise.
- ✳ **Policy should not attempt to promote investment for its own sake. Nor should it try to 'reverse' long-term structural shifts, such as the growth of the services economy.**
 - Specific tax incentives aimed at bringing forward investment are unlikely to boost long term productivity growth. The effects of taxation on the incentive to invest are better dealt with via structural tax reform rather than one-off measures.
- ✳ **When the economy is close to full employment, there is not a strong policy case for governments to increase public investments as a macro-economic response to fill a perceived gap left by low private investment. This might work as a counter-cyclical measure in times of low aggregate demand, but the same logic does not apply on the supply side, especially in a full employment economy.**
 - Governments can nonetheless play an important role in the efficient provision of public infrastructure, and minimising the distortionary effects of policy and regulatory interventions.
 - Public projects should always be rigorously assessed for social benefits, especially when the opportunity costs for scarce labour and other resources are at a premium. Commonwealth and State Governments could review the appropriate application of discount rates in project assessment and cost benefit analysis.
 - More accurate pricing (e.g. of transport infrastructure) can facilitate more efficient investment and in some cases reduce the need for costly new projects.
- ✳ **Policy should mainly focus on removing barriers to private investment.**
 - Complex planning regimes and major project assessments can be improved.

2.1 The investment challenge

Investment is a bet on an uncertain future. It involves an up-front cost in anticipation of a possible stream of future revenues or benefits. In the real (non-financial) economy, investment almost always involves some form of change — a new production process, a new business, a new product. As a result, investment and productivity growth tend to go hand in hand. Both usually involve a degree of disruption.

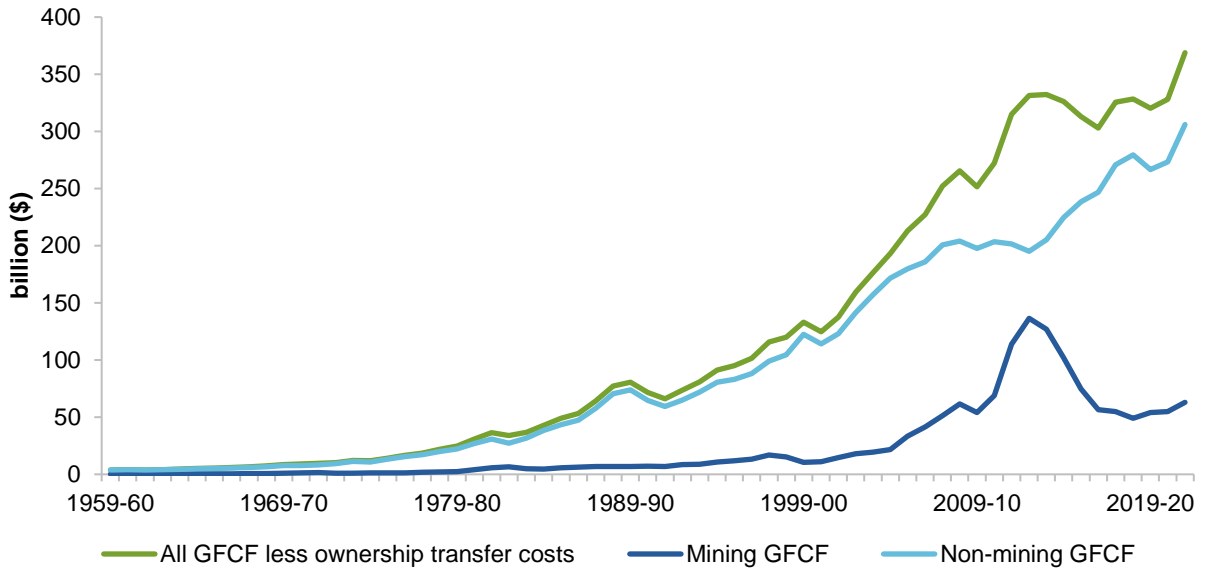
Investment decisions depend on the ability of an investor (entrepreneur) to perceive an opportunity, have the appetite to take the associated risk and the access to the necessary resources and finance to implement the change.

Conventional economic theory implies that investment *causes* productivity, through a higher capital to labour ratio (i.e. capital deepening), which tends to mean more output per hour worked (i.e. labour productivity). This is partly true — as noted elsewhere in this report, new technology can replace tasks, improve processes and thereby augment human labour. But in many ways, investment is a *symptom* of productivity growth as much as it is a *cause*. When new (productivity-enhancing) ideas are being generated and adopted; where risk appetite is strong and regulatory uncertainty minimised, investment will tend to occur.

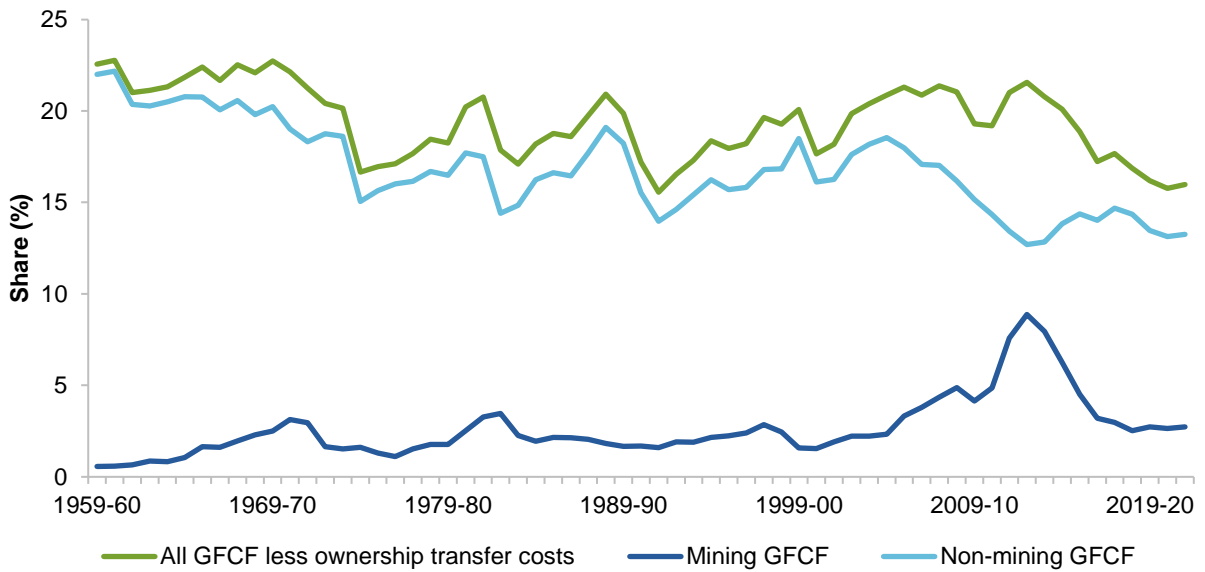
Non-mining business investment in Australia has generally trended lower as a percentage of GDP over recent decades (figure 2.1). Similar patterns have been observed across a number of other advanced economies (Debelle 2017; Hambur and Jenner 2019; Minifie 2017), suggesting that structural factors may be playing a role. Post-global financial crisis, lower than average capacity utilisation rates in key Australian sectors may have also made a contribution. While business investment intentions for 2022-23 have started to increase in levels terms (figure 2.2), following a notable increase in capacity utilisation rates during COVID-19, additional factors may have contributed to subdued investment growth over recent years and a reversal may necessitate changes in a number of policy areas.

Figure 2.1 – Non-mining investment has stagnated

a. Private capital formation, 1959-60 to 2021-22, current prices

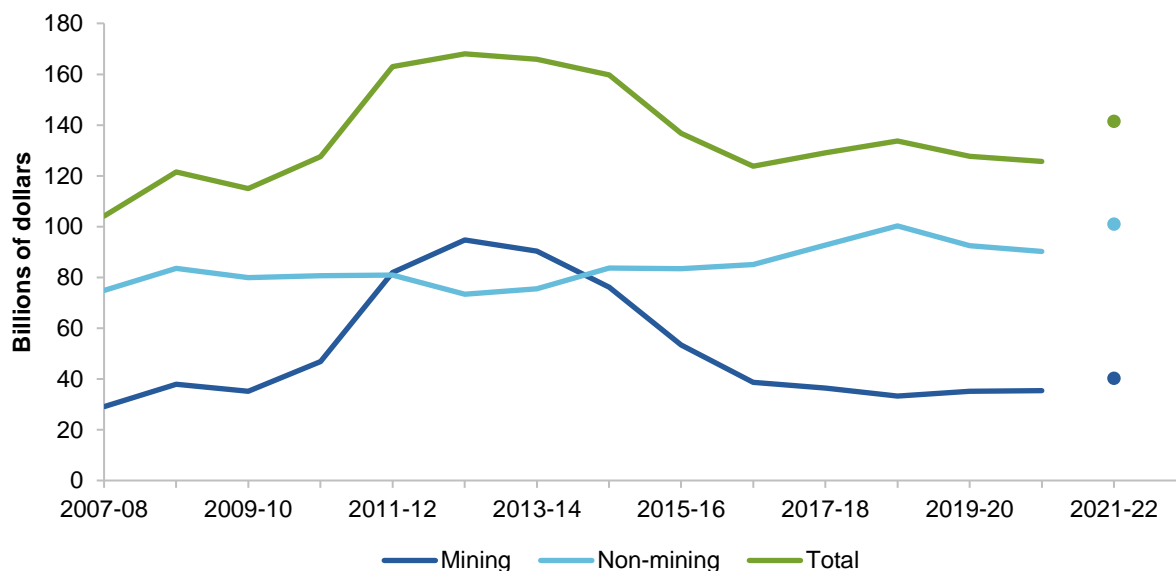


b. Private capital formation as share of GDP, 1959-60 to 2021-22



Source: ABS (*Australian System of National Accounts*, 2021-22 financial year, Cat. no. 5204.0, tables 1 and 52).

Figure 2.2 – Businesses expect to increase investment in the next two years
Capital expenditure intentions^a



a. Forecasts are firms' expected capital expenditure; adjusted for past average differences between expected and realised spending.

Source: Productivity Commission estimates based on ABS (*Private New Capital Expenditure and Expected Expenditure, Australia*, March 2022, Cat. no. 5625.0).

What explains subdued investment growth?

Two aspects of aggregate investment are useful to keep in mind in unpacking the likely causes of the decline: first, as noted above, aggregate investment is made up of individual investment decisions made within the relevant business environment; second, aggregate investment reflects the composition of the economy, and the heterogeneous experiences of different sectors.

Investment decision-making

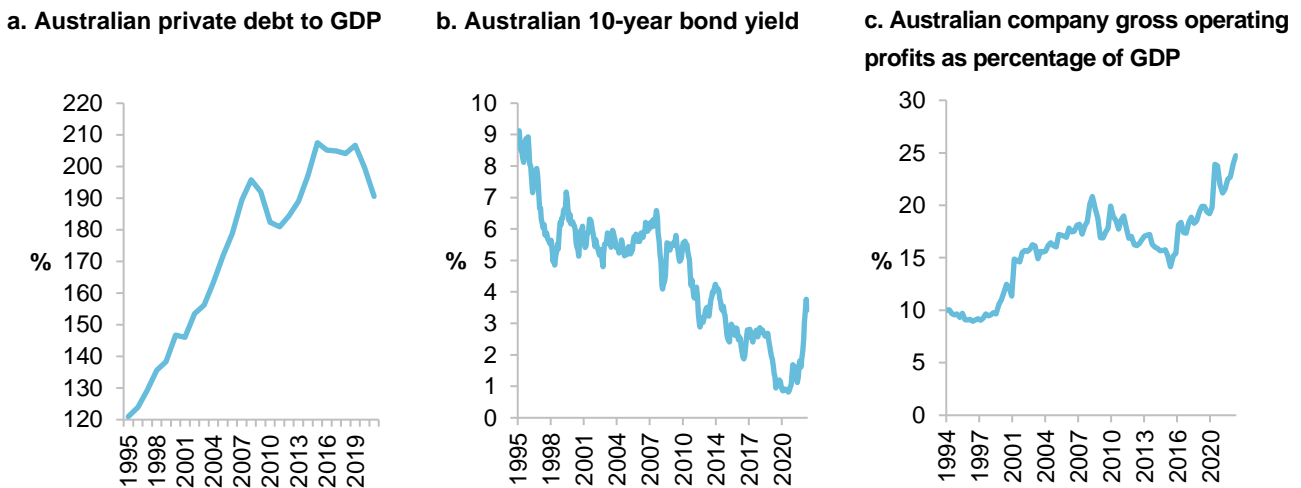
Businesses make investment decisions based on expected net returns in the context of uncertainty. These expectations are a function of the business's own capabilities as well as a range of external factors — the policy and regulatory environment, the prevailing and expected future economic climate, current and forecast levels of demand, borrowing costs — viewed through a lens of risk and uncertainty. Some international evidence suggests that the global decline in investment is related to slower economic growth (Gutiérrez and Philippon 2016). However, for non-mining investment in Australia, the RBA recently found that:

... [investment] spending ... has been even weaker than predicted by our standard aggregate model. Similarly, we have examined firm-level data and found that corporate investment has been consistently weaker than would be predicted based on past relationships with Tobin's Q (a forward-looking measure of investment opportunities). (Debelle 2017, p. 6)

While financing constraints have been found to play a role in explaining weak investment outcomes internationally, Australian business data suggests that the cost and availability of finance is generally not weighing on investment in Australia (Debelle 2017, pp. 9–10). Aside from recent increases, nominal borrowing costs have been at relatively low levels for the past decade (figure 2.3, panel b).

At the same time, profitability rates have been relatively stable (figure 2.3, panel c), which intuitively, would contribute positively to investment growth. Generally speaking, declining borrowing costs should stimulate investment growth, bringing down private returns to capital. But instead, the evidence points to a growing wedge between risk free rates and the private return to capital. This might suggest alternative influences on business decision making.

Figure 2.3 – Australian debt, profits, and the cost of borrowing



Source: OECD (*OECD.stat, Financial indicators – stocks: Private sector debt*, 1995 to 2021); RBA (*Capital Market Yields – Government Bonds – Monthly*, July 2022, July 1995 to July 2022); ABS (*Business Indicators, Australia*, June 2022, Cat. no. 5676.0).

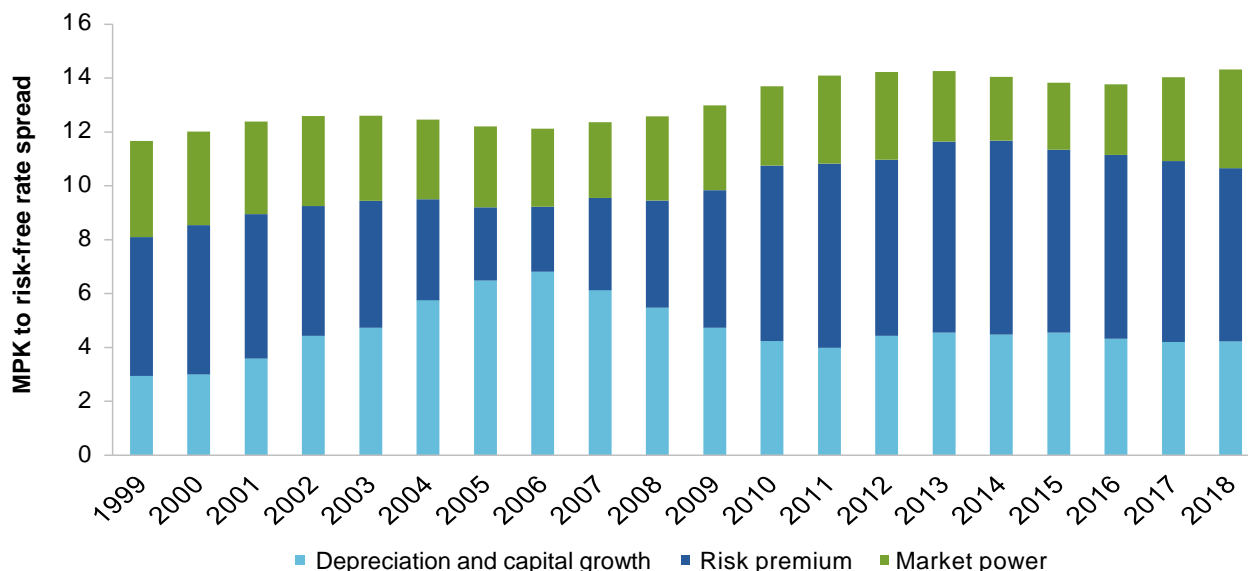
A range of factors are relevant to individual investment decisions, including the opportunity cost of capital, perceptions of risk, and the degree of market power enjoyed by firms.

The market risk premium (the additional return investors require to be compensated for taking on risk) has increased in Australia, particularly since the global financial crisis (figure 2.4).²⁹ While higher risk premiums are likely to have contributed to subdued investment growth, it is unclear to what extent they reflect perceptions that risks in general have increased (i.e. a greater likelihood of negative events, or that their cost has increased), or changing attitudes to risk (i.e. increased risk aversion) or simply increased responses to a risky environment. The market risk premium is likely to rise when various financial events alter firm perceptions of risk and the likelihood of an adverse outcome.

Economic shocks and events are also likely to influence investment decisions in other ways. The opportunity cost of capital is likely to have changed during the mining boom (from about 2010 to 2012), skewing investment at the time towards the mining sector. Finally, market power enjoyed by firms may increase the rate of return achieved on those investments, relative to what might otherwise be the case.

²⁹ An estimation of the relative contribution of each of these factors to the wedge between the private return on capital and risk-free rates can be obtained by adjusting the standard riskless user cost of capital to reflect changes in market power and changes in risk. The Commission is undertaking separate research analysing risk in business decision making, with publication forthcoming.

Figure 2.4 – Components of investment to risk-free rate spread
Five year moving average



Source: Productivity Commission estimates.

It is difficult to establish empirically whether risk aversion itself has risen in Australia over the past decade. Qualitative evidence suggests that businesses have tended to require expected returns on capital to exceed the cost of capital by a high margin (i.e. high ‘hurdle rates’) (Lane and Rosewall 2015). Australian survey evidence suggests that hurdle rates have remained broadly constant even while borrowing costs have fallen over the past decade (Edwards and Lane 2021). Consistent with these observations, data from Australian-listed companies show that the aggregate return on invested capital (ROIC) has been ‘high and relatively constant over the past 20 years, notwithstanding a large decline in 2020’ (p. 14). To the extent that hurdle rates remain broadly unchanged while borrowing costs fall, business investment will be lower than what we would otherwise expect, weighing on productivity growth over time.

It may be premature to conclude that business risk appetite in Australia has fallen (leading to higher risk premia in investment decisions).

There is some evidence that historically, the risk premium and the risk-free rate have tended to move in opposite directions, leaving the overall hurdle rate quite stable over time. Jordà et al. noted:

Curiously, the bursts of the risk premium in the wartime and interwar years were mostly a phenomenon of collapsing safe rates rather than dramatic spikes in risky rates. In fact, the risky rate has often been smoother and more stable than safe rates, averaging about 6%–8% across all eras. Recently, with safe rates low and falling, the risk premium has widened due to a parallel but smaller decline in risky rates. But these shifts keep the two rates of return close to their normal historical range. Whether due to shifts in risk aversion or other phenomena, the fact that safe rates seem to absorb almost all of these adjustments seems like a puzzle in need of further exploration and explanation. (Jordà et al. 2017, p. 5)

Risk-free rates fell, and risk premia appear to have risen, in the decade following the global financial crisis – a period of highly expansionary monetary policy. It will be important to observe the movement in hurdle rates as monetary policy and risk-free rates normalise. At that point, we will be better able to judge whether business risk appetite has fundamentally shifted over the past two decades or so.

Structural changes are having a limited effect

Aggregate measures of investment can mask the heterogeneity of experiences across the economy. For instance, technological progress has given rise to new opportunities for investment, and this has occurred unevenly across sectors.

Long-term structural changes in the economy are likely to have had an enduring effect on the nature and level of investment. In particular, the shift towards a services-driven economy may mean that a lower rate of investment in physical capital may be necessary, while investment in intangibles (such as trademarks, software and managerial capacity) are likely to play a stronger role (PC 2020b, pp. 10–11). Minifie (2017) pointed to a group of service industries that were 'less than half as capital intense as the average non-mining market sector', noting that they had comprised half of market sector output in the early 1990s, growing to almost two-thirds in 2017.

Other evidence suggests structural change has only had a limited effect on investment levels since the GFC. Hambur and Jenner (2019) use Australian firm-level tax data³⁰ to demonstrate that compositional change in the economy explains only a 'very small share' of the decline in post-GFC investment. They found that investment declined for firms regardless of industry, age, or cohort. Moreover, the overall investment intensity rate (the change in capital stock relative to output) declined by about 5% in the past decade, in part due to a lack of productivity growth and lower depreciation rates.

Private capital expenditure has varied across industries over time (figure 2.5). Investment in manufacturing reduced significantly as a proportion of capital investment — largely coinciding with reductions in government assistance to the sector, general reduction in manufacturing output, and a broader structural shift towards resources. The composition of Australia's services sector will have a bearing on the rate of capital investment required to deliver productivity improvements.

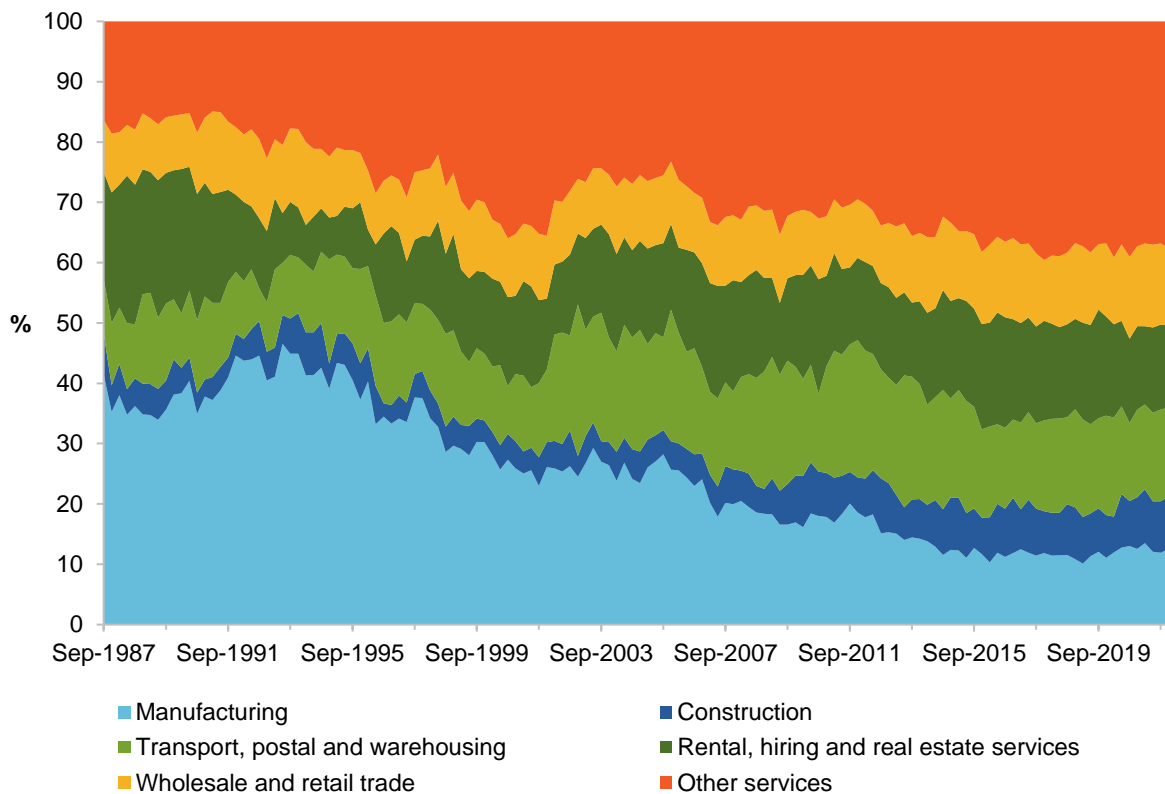
Investment levels are, not surprisingly, also related to firm size. The decisions of a relatively few larger firms have often driven trends in observed aggregate investment. The RBA found that small and medium enterprises (SMEs) comprised over 99% of non-mining firms, but accounted for only about 60% of non-mining investment (Dynan 2021, p. 3). Firms with output between \$50 million and \$5 billion represented just 0.3% of all firms, but were responsible for one-third of all investment. The largest 30 firms accounted for almost 10% of investment.

Access to credit for investment can be more complicated for SMEs. While new sources of finance have become increasingly important for SMEs (PC 2021e),³¹ the availability of credit for SMEs more broadly and its uptake will be influenced by further development of the non-bank lending sector, as well as greater awareness among SMEs of new financing options (pp. 41–46). Reforms to the bank capital framework came into effect from January 2023 may also make SME lending more attractive to banks at the margin (Bank and Lewis 2021, p. 45).

³⁰ Using the Business Longitudinal Analysis Data Environment (BLADE) dataset.

³¹ Based on data from September 2021, the Commission found the main remaining gap was in the market for unsecured finance between \$250 000 and \$5 million (p. 39).

Figure 2.5 – Private capital expenditure has varied by sector
Quarterly private capital expenditure by industry, share of total



Source: ABS (*Private New Capital Expenditure and Expected Expenditure, Australia, March 2022, Cat. no. 5625.0, table 7*).

Emerging trends that will influence investment

The evidence suggests that a number of factors have an influence on investment decisions, and it is difficult to pinpoint which factors have most shaped investment trends in Australia and internationally. It is also clear that many drivers of investment are subject to change. Policymakers will need to consider how emerging trends (as well as uncertainty) could affect the investment landscape in the medium term.

Trends in global foreign investment

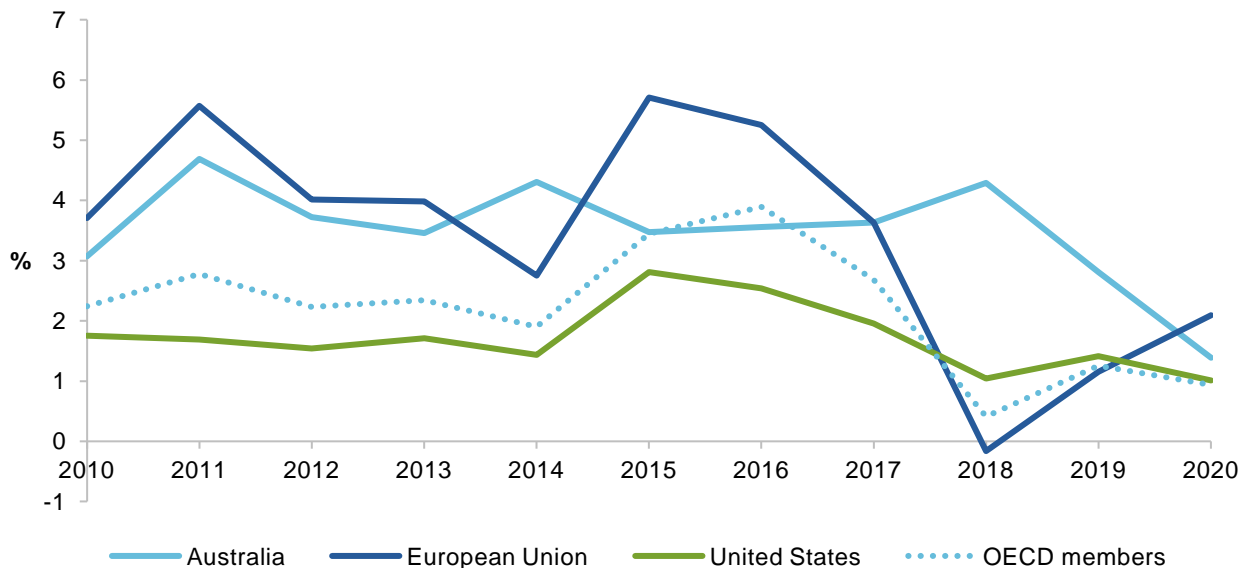
While foreign direct investment (FDI) makes up a relatively small proportion of total investment in Australia, it plays an important role given Australia’s position as a net importer of debt-based financing and a net exporter of equity-based financing. FDI plays a larger role in some industries than others — the value of FDI applications in the past 5 years has favoured services, commercial real estate, and heavy industry (PC 2022f). It is also associated with innovation at the firm level (Majeed and Breunig 2021).

Inbound FDI flows have fallen as a percentage of GDP in recent years for Australia and several advanced economies (figure 2.6). As a percentage of GDP, Australia’s inbound FDI began to decline prior to the pandemic and, as at 2021, had not rebounded to pre-pandemic levels. Other advanced economies have also experienced declining FDI in proportion to GDP.

FDI trends cannot be wholly attributed to Australian policy, as they also depend on conditions in other countries competing for investment, as well as conditions in source countries. While it is impossible to predict

how global investment patterns will evolve, it would be valuable for Australia to remain open to harnessing opportunities — a number of regulatory frameworks can affect FDI decisions at the margin (chapter 3).

Figure 2.6 – FDI inflows to Australia have declined
Inbound FDI flows as a share of GDP, 2010 to 2020



Source: World Bank (2022a).

The investment needs of the climate transition

The transition to a net-zero emissions economy by 2050 will require a significant scale of new investment in the Australian economy. The Australian Energy Market Operator estimated that the National Electricity Market would require about \$170 billion of capital investment to 2050.³² These investments would be required to address a forecasted doubling of electricity consumption from the grid by 2050, due to new demand sources (e.g. transport, heating, cooking and industrial processes) and the removal of a large proportion of coal generation. Deloitte estimated that the transition to net zero by 2050 would require \$70 billion of capital reallocated away from emissions intensive assets, and \$420 billion of additional investment compared with an economy not transitioning (DAE 2022, p. 2).

While public investment can play a role in addressing market failure, the risks associated with industry assistance will likely be prominent in Australia's decarbonisation efforts. Significant ongoing public expenditures have already been put towards supporting emerging technologies. While new technologies will be crucial for decarbonising, there are risks that selected technologies fail to commercialise, or prove ineffective in the mitigation task, or provide poor additionality (PC 2022f). And while some degree of risk is inherent in such investments, governments can often be reluctant to (or persuaded not to) abandon investments when technologies fail to develop (Banks 2008, p. 15; Emmery 1999; Neely 1993; *The Economist* 2010; 2022). Regular and transparent review of public expenditures will remain crucial to minimising the potential for such market distortions.

³² This includes investment to achieve a nine-fold increase in grid-scale wind and solar capacity, a three-fold increase in the firming capacity (dispatchable storage, hydro and gas-fired generation) and a five-fold increase in distributed solar (AEMO 2022).

As such, private investment will be needed in a relatively large scale. In addition to the general landscape that affects investment broadly, the incentives for investment in decarbonisation will be key — including how mitigation is priced, and the transparency and rigour of offset markets. In the absence of an economy-wide price on carbon emissions, there is a greater risk that public and private investment fails to reach the most efficient and effective technologies. A technology neutral approach will be important to guide investment to technologies that will promote least-cost abatement (for instance, in carbon capture and storage, energy generation, and energy storage) (volume 6).

Implications for policy

The observed **subdued investment growth warrants some attention** from policymakers. While measured investment levels may underestimate investment in intangibles, which is increasingly important to service industries,³³ subdued investment growth could reflect some weakening of key drivers of productivity growth, with potentially significant implications for Australian living standards.

It is also important for policy to reflect the fact that **productivity and investment are interrelated**.

Productivity-enhancing reforms can promote economic growth and improve returns to investment. In turn, investment can be the proximate cause of productivity growth. But interventions to simply boost investment levels directly cannot be guaranteed to boost productivity.

Policy should not attempt to promote investment for its own sake. All investment carries opportunity costs — it uses up scarce resources that could otherwise be used for current consumption. An important role for government is ensuring that investors face prices (output prices, input prices and interest rates) that are not distorted and broadly reflect social costs so that investments increase national income. In practice, this means that policy settings would neither discriminate in favour of particular kinds of investment nor consumption over investment.

The objective should not be to ‘undo’ or ‘reverse’ structural causes, to the extent that structural shifts reflect Australia’s comparative advantage (and relative prices). The relative decline in investment has not been due to any singular consistent cause or trend, despite relative consistency across time and indeed in other advanced economies. In part, lower investment intensity may be the result of developments that are not wholly undesirable, such as structural shifts in the economy and the reliance on longer-lived assets. It may also reflect perceptions of and attitudes to risk, or undesirable developments, such as low productivity growth that reduces returns on investment.

A broader view of policy is required. The hurdle rates for investment observed in Australia have been relatively consistently high over the past decade, suggesting higher risk premia offsetting lower capital costs. This suggests that any attempts by governments to influence investment decisions will require consideration of a broader mix of policy settings — not only the cost of funds, but also those policies that influence the broader economic climate and might unduly increase the uncertainty about future benefits.

Broadly, the suite of policy issues discussed across this report will have a bearing on investment: for instance, aspects of foreign investment are discussed in the context of trade policy settings (chapter 3); and Australia’s climate change policy settings (volume 6) will help to determine the efficiency of resource allocation across the economy.

³³ Volume 5 of this report — *Innovation for the 98%* — details capital spending in physical and intangible assets over the past 60 years.

2.2 Taxation, investment and productivity

The tax and transfer system has a direct influence on investment decisions. By taxing some activities at higher rates than others, the system can skew incentives and economic activity away from more productive activities. Transitioning Australia's tax system towards less distortive, more efficient approaches is an enduring policy priority. It will become more salient as governments contend with the ageing population, changing consumption patterns and the need for fiscal repair.

While specific tax incentives could aim at bringing forward investment, piecemeal tax incentives alone are unlikely to boost long term productivity growth. The effects of taxation on the incentive to invest are better dealt with via structural tax reform rather than one-off measures.

The role of taxation in driving productivity

At a broad level, several aspects of the tax system warrant particular attention. The tax system can influence productivity growth through five main channels:

Skilled labour supply decisions — particularly via income and payroll taxes, which can affect labour market participation, hours worked, incentives for further human capital investment and incentives to migrate to Australia. These effects can vary with gender, household structure, age and income. They can be compounded by aspects of the transfer system, which can lead to high effective marginal tax rates. Other payments, such as child care subsidies, can alleviate adverse incentives over some income ranges.

Labour participation may or may not have a large impact on productivity. A higher participation rate primarily increases GDP per capita, rather than GDP per hour worked. However, productivity can be affected to the extent that highly qualified workers reduce their hours worked, or work for a period of time in lower skilled occupations. Decisions about human capital investment, entrepreneurialism or decisions to switch jobs are another channel through which labour taxation can influence productivity.

Saving and investment decisions can be distorted due to the varying tax treatment of different savings and investment options. If investment and asset allocation decisions are based more on preferential tax treatment than underlying economic return, productivity can be adversely affected.

Gaps between the corporate tax rate and marginal personal income tax rates, differential tax rates for large and small companies, differences in statutory depreciation rates and the non-deductibility of equity all have some potential to distort outcomes.

Differences in tax rates between categories of taxpayers can also create distortions in savings and investment over time. For example, the greater the differential between corporate taxes and personal income taxes, the greater is the incentive for company owners to hold profits as retained earnings and delay their distribution as personal income to later periods of life when they face a lower marginal tax rate.

Ease of asset transfers and efficient capital allocation can be significantly impacted by transaction taxes like stamp duty. These taxes can hamper worker mobility and housing choice, and be a barrier to efficient transactions, which would see assets transferred to a higher value use.

For example, Shiran (2020) finds in a study of Melbourne residents that stamp duty significantly reduces mobility of homeowners, and locks in longer work commute times. Davidoff and Leigh (2013) find that a 10% increase in stamp duty lowers housing turnover by 3% in the first year and by 6% if sustained over a 3-year period.

Efficient allocation of capital is also relevant in achieving efficient user charging for public infrastructure such as roads. The current fuel excise system, while a significant traditional source of revenue for government, is not sustainable for this purpose (given the growing share of electric vehicles).

Tax settings can affect the **ease of entry and competition** through both consolidation rules and the non-neutrality of taxation of corporate debt and equity — both of which could contribute to incumbency bias, particularly if new firms are more likely to initially be financed through equity. For example, some new firms in the services sector might have limited tangible business assets against which to borrow, relying more on equity to finance initial operations. Tax arrangements that become less favourable as businesses grow beyond a threshold size can also impede competitive pressure.

Risk management can be hampered at the margin by state insurance taxes. The asymmetric treatment of profits and losses could also work to diminish firms' risk appetite. Alternatives that have been suggested (though none are necessarily straightforward) include some loss refundability (such as via a business cash flow tax), the carry-back of losses or the indexation of losses carried forward.

Towards greater neutrality and efficiency

In general terms, both tax rates and tax neutrality issues will be highly relevant to productivity. The marginal excess burden (i.e. efficiency loss) from a tax tends to rise exponentially with the tax rate. Working towards greater neutrality of tax — for instance, between firms, between savings vehicles and, where appropriate, between labour and capital income — should have positive impacts for tax efficiency and productivity.

The question of neutrality between equity and debt will become even more salient depending on future approaches to dividend imputation. Imputation has been a central feature of the Australian tax system since the 1980s, addressing the double taxation of dividends that would otherwise occur. One effect of imputation is to heighten the 'home country bias' of domestic investors, including superannuation funds, as noted by the Tax and Transfer Policy Institute (Murphy 2018). The Retirement Income Review (Callaghan Review) noted that between now and 2060, the scale of Australia's superannuation assets under management are projected to rise from about 110% of GDP to just under 250% (Treasury 2020). While the extent to which this home country bias impacts Australia's productivity growth is not known, the question will likely arise as to the desirable (and sustainable) level of home country bias that is appropriate once investible funds are of such a scale relative to the domestic economy.

There is a view that despite Australia's dividend imputation system, there is the potential for investment to be influenced by corporate tax treatment. A number of reforms have been canvassed to create greater neutrality between debt and equity financing, including an allowance for corporate equity (ACE), and allowance for corporate capital (ACC), comprehensive business income tax (CBIT) and business cash flow tax. The Tax and Transfer Policy Institute has favoured the ACE, as it poses fewer implementation challenges (Sobeck et al. 2022). It has the attractive attribute of effectively taxing marginal investments (those making a normal rate of return) at zero, thereby potentially encouraging new investment.

In addition, the tax and transfer system can affect productivity through its complexity. To the extent it absorbs scarce resources for system compliance and administration, this can divert time and resources away from more productive activities. As governments (state and federal) alter the tax system over the next decade, they should look to systematically transition the system to be more supportive of productivity growth across the five domains outlined above.



Recommendation 3.4

Transition the tax system to invigorate productivity growth

In their use of the tax system for fiscal consolidation over the next decade, governments should, including through the Council on Federal Financial Relations, systematically transition the tax system to be supportive of productivity growth through tax arrangements that:

- promote skilled labour supply
- improve tax neutrality in respect of savings and investment
- encourage efficient asset transfers and capital allocation
- foster market entry and competition
- support efficient risk management by firms and individuals.

2.3 Improving the business environment for private investment

While there may not be a strong policy justification for promoting investment for its own sake, or for using public investments to fill a gap in private investment, governments can nonetheless avoid situations where policy and regulatory interventions create undue barriers to investment (for instance, by ensuring that the regulatory environment meets its objectives as efficiently as possible).

Reducing the distortionary effects of public expenditure

Public investment decisions can have varying and sometimes countervailing effects on private investment. For instance, public investment:

- can promote private investment, partly due to private sector delivery of public projects but more broadly through benefits of using infrastructure and potential generation of spillovers throughout the economy (Debelle 2017)
- carries opportunity costs that are heightened in times of relative scarcity of resources (such as a tight labour market).

Under full employment conditions, the opportunity cost associated with any public expenditure and the potential for crowding out will be heightened, not only in relation to other areas of public funding, but also in relation to the resources available to the private sector.

The resource constraints associated with full employment are exacerbated by an environment where Australian Government expenditure has reached peak levels — which are only partly explained by the pandemic, and partly by related trends in industry assistance (box 2.1). The prevailing labour market conditions provide additional reason to carefully assess the opportunity cost of using public funds.

Box 2.1 – Industry assistance creates distortions

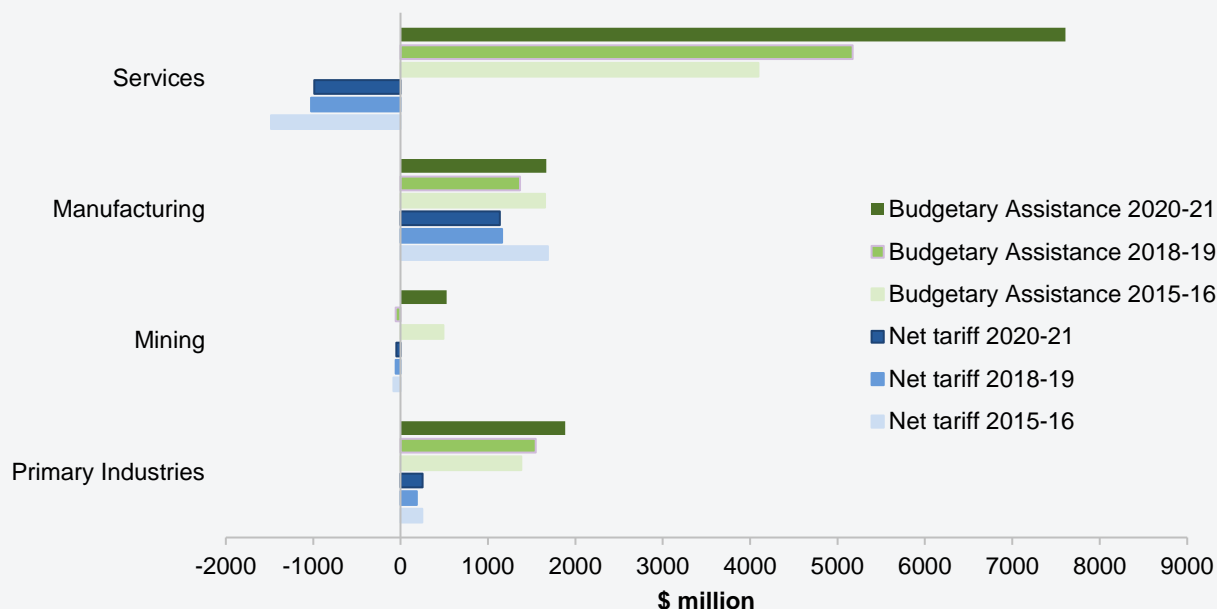
Australian Government assistance to industry has reached historic high levels — even after excluding economy-wide COVID-related programs of expenditure (figure below). Aside from once-off emergency expenditures, significant amounts of expenditure have been committed over the next decade.

Some public expenditure programs deliberately or inadvertently discriminate in favour of a particular section of the economy. This includes outlays, concessions, or other favourable conditions for particular sectors, industries, or businesses of a particular type or size. To the extent that supports are material enough to prevent business exits, this reduces business dynamism and impedes more efficient allocation of resources.

Government assistance to industry would ideally be geared towards projects or sectors with significant social spillovers that cannot be fully captured by private investors (that is, private investment alone will not lead to the most productive level of investment). To best utilise scarce public funds, the government should rigorously check that the spillovers reflect a failure of private investment markets. Costs and benefits should be assessed, including the alternative uses of funds and potential to crowd out private investment. With the current full employment conditions, it is important to consider the risk of reallocating resources away from more productive uses to those with lower or less certain payoffs.

Industry assistance has increased in the past five years^a

Net tariff assistance and budgetary assistance 2015-16 to 2020-21



a. Excludes economy-wide expenditure programs such as JobKeeper, Boosting Cashflow for Employers, Backing Business Investment, and the expansion of the Instant Asset Write-Off.

Source: Productivity Commission estimates.

One of the risks of industry assistance is that it can continue for a prolonged time without scrutiny. There are often strong in-principle rationales for government intervention initially (for instance, with regard to the COVID-19 pandemic and climate change). But without sufficient policy scrutiny, in-principle rationales can provide ‘cover’ to poor public investment choices, open-ended assistance and rent-seeking behaviour (PC 2022f).

Improving the regulatory environment for private investment

Governments can promote investment by ensuring regulatory settings avoid undue impediments to commercial decisions, without sacrificing the social benefits of regulation. The Commission has provided numerous examples of regulatory areas where this would be advantageous, including regulatory approvals (PC 2013); and more efficient freight transport (PC 2020a). As noted in chapter 1, further simplification of planning and zoning regulations would not only facilitate competition (by reducing barriers to market entry) but would allow better value use of scarce land resources. An additional area of policy with potentially significant implications for investment relates to approval processes for major projects.

Approval processes for major projects

Survey evidence from Infrastructure Australia suggests that both investors and contractors viewed planning and environmental approval processes as a source of delay and uncertainty for project timelines (Infrastructure Australia 2021, p. 44). The costs of delays can vary. In oil and petroleum, the Commission has previously estimated that delaying a major project by one year could reduce the net present value of returns by 10–20% (simply by delaying income streams) (PC 2009, p. xxv).

Reducing the delay times associated with regulatory approval processes is a perennial challenge. From a policy perspective, it should not be mistaken for an assumption that approval processes themselves are redundant or poorly administered. Nor does it signify that the regulation of environmental and social impacts should be reduced or removed, such that more projects are undertaken regardless of negative externalities.

Rather, if approval processes can continue to protect against social costs of major projects, while further reducing uncertainty and delay, this could result in significant productivity benefits. And as noted by Infrastructure Australia, at an economy-wide level, the costs associated with delay to major projects will be magnified by the scale of the upcoming infrastructure pipeline.

While it is beyond the scope of this report to investigate all regulatory approval processes in detail, one recurring theme relates to delays caused by administrative complexity.

Addressing the complexity of approval processes

As noted by CME, businesses are often required to coordinate across multiple layers of government to obtain approvals, and the requirement to meet increasingly onerous conditions attached to many approvals (e.g. in relation environmental approvals) prompted concern over delivery times. CME noted that there is duplication of similar types of information requested by different agencies for similar regulatory outcomes under various legislations (CME, sub. 52, p. 4).

For public infrastructure projects, key planning and environmental approvals are typically obtained by the state, with minor and technical approvals obtained by the contractor. Issues arise where:

- Key decisions around design requirements are not made early in the process and mandatory approval requirements are unable to be clearly defined and articulated. This creates a risk that the final design is likely to have elements requiring rework after contract award, leading to potentially significant time and cost overruns.
- During delivery some smaller approvals require the contractor to consult or obtain consents from numerous stakeholders, where it can be argued that the State can more easily manage. (Infrastructure Australia 2021, p. 44)

In the resources sector, some approval requirements have been moved from the primary approval process into the so-called 'post-approvals' phase, which lack statutory timeframes and reporting requirements (PC 2020e).

This can result in situations where primary approval processes are completed according to statutory timeframes, only to leave uncertainty and delay in the post-approval processes.

Some have noted that for major *public infrastructure* projects, a key question relates to who should bare the risks of approvals and associated delays. For instance, among respondents to Infrastructure Australia's survey on risk, three quarters of private sector stakeholders felt that governments should bear the risks of planning approvals (along with 43% of government respondents).

For major projects arising from the private sector, one way in which the Australian Government reduces the administrative complexity of approvals for major projects is through the Major Projects Facilitation Agency (MPFA).³⁴ The MPFA is the Australian Government entry point for developers of projects over \$20 million, which assists by providing information on approvals, mapping critical approval pathways and processes, and raising issues with regulators.

A more substantial improvement to approval processes could be achieved through a 'single-touch approvals' system, which has been confirmed as a commitment of the Australian Government. This system will involve the Australian Government accrediting State and Territory approval processes, providing the opportunity for businesses to obtain approval from a single application. Accredited approval processes will be subject to National Environmental Standards, which will be integrated into existing accreditation arrangements. The implementation of single-touch approvals depends in part on how quickly the process of accreditation will proceed. And given the gradual nature of implementation that will result, the effectiveness of the system will also depend on the role and performance of the new Environment Protection Agency (McCredie, Bergman and Smith nd).

The introduction of the single-touch approval system could eventually contribute significantly to improving the business environment for investment. More broadly, policy must continue to ensure that approval processes are both efficiently administered and are proportionate to the risks of the project.

2.4 Ensuring efficient public investment

Public investment can play a significant role as a key determinant of total investment in the economy. The extent of public investment (and the choice of investment projects) should be guided by net social benefit, taking into account the costs of taxation. Moreover, it plays a particular role in addressing market failure, often (but not exclusively) via the provision of public goods such as public infrastructure.

In many respects, there is a well-established literature on best practice for public procurement and investment. The Commission has previously recommended a number of improvements to the provision of public infrastructure, including in the project selection stage (with strong cost-benefit analyses) as well as proficient procurement processes (PC 2014). Rigorous assessment is all the more important when the opportunity costs of scarce labour and other resources are at a premium.

One challenge for governments relates to the application of best practice at the planning and procurement stages.

- The use of cost-benefit analysis is variable across government projects (volume 5). In some cases, such analysis is absent, or of poor quality, or is disregarded by decision-makers. Institutional and governance arrangements could be better designed to adopt the best practice elements of cost-benefit analysis (CBA) and to make the results a more prominent consideration for government officials in the project selection process.
- The choice of discount rates in the CBA process can lead to a wide range of forecast costs and benefits, depending on assessment of risk. There is always scope for discount rates to be chosen 'conveniently' to

³⁴ Prior to 11 May 2017, functions performed by the Major Projects Facilitation Agency (MPFA) were undertaken by the Major Projects Approval Agency (MPAA) and the Major Project Facilitation (MPF) Programme.

emphasise potential benefits or downplay potential costs. A single discount rate is unlikely to be appropriate, as rates should vary with project risk (Harrison 2010). However, given the implications of wide variations in discount rates in public procurement — both for industry and for the efficiency of public investment — Australian governments could review the appropriate application of discount rates with a view to achieving a more nuanced approach.

An additional challenge for governments relates to the use of pricing mechanisms to manage infrastructure usage, maintenance expenditure, and capacity, particularly with regard to road and public transport infrastructure (discussed below).

Public road infrastructure

The provision of road infrastructure is a key area of public investment with a direct bearing on productivity, and where mechanisms for funding and investment could be substantially improved. More efficient funding and charging mechanisms could apply to the general provision and maintenance of roads and the costs of urban congestion.

How public road provision and maintenance could be better funded

The construction and maintenance of public roads is funded from taxes and charges collected by all levels of government (box 2.2) and sometimes from tolls collected by private businesses. Most of the many vehicle-related charges have some effects on the demand for vehicles and road use (net fuel excise, registration costs, parking levies, licence fees, revenue from goods and services taxes and fringe-benefits taxes) but do so indirectly. Since 2004-05, there has been a relatively strong link between total road-related taxes, charges and spending, suggesting that investment is affected by the aggregate revenue, though changes in revenue collected from any given source is not strongly related to spending. Three tax sources are more directly related to the marginal use of roads, though only one (tolls) has an explicit link to investment.

Tolls are charged on some freeways, mainly levied on a per-use basis, but sometimes using distance and time of day as an aspect of the price. Investment decisions for toll roads are based on expected toll revenue, which provides a link between investment for specific projects and demand or usage.

A **'Road User Charge' is levied on heavy vehicles** via the fuel tax credit system (as a component of fuel excise). The Road User Charge is 27.2 cents per litre of diesel used by heavy vehicles on public roads. In addition, there are a highly-developed set of registration charges that depend on truck types, axle number and trailer type (NTC 2022; PCC 2022). Charges are not explicitly distance-based at the individual vehicle level, but reflect the average distance travelled and the estimated average road maintenance and capital costs incurred by classes of similar trucks. To the extent that trucks are used at similar capacity levels, this resembles a distance-based charge levied at the truck level. The charges are not directly related to use of particular roads by individual trucks.

Fuel excise applies to all vehicles as a charge of 47.7 cents per litre. Fuel excise is only an indirect form of road user pricing (PC 2022f, p. 56). It does not differentiate between vehicles with different fuel efficiencies and impacts on road surfaces and imposes no charge on road use by Australia's growing fleet of electric vehicles since their fuel is not taxed. Fuel excise revenue has steadily declined as a proportion of road-related revenue in the past decade (figure 2.7). Ultimately, excise will become redundant as Australia's vehicle fleet is switched to non-polluting technologies. As recognised by the Australian Government in the context of its National Electric Vehicle Strategy:

Planning is also required as future fuel excise revenue declines from reduced consumption of petrol and diesel. While this revenue is not currently earmarked for expenditure on roads, it is an

important source of funding. In the long run, Australia will need a more sustainable and fair way to pay for roads. (Australian Government 2022, p. 14)

Box 2.2 – Road funding is a shared responsibility

Generally, responsibility for the project management of capital and maintenance expenditure for road assets lies with the State and Territory and local governments (for arterial and local access roads, respectively).

The Australian Government provides part or whole contributions to projects based on its investment priorities and largely under the framework set out under the National Land Transport Act 2014 (Cth), and the supporting National Partnership Agreement on Land Transport Infrastructure Projects (under the Federal Financial Relations Framework). The National Land Transport Act stipulates the conditions under which the responsible minister(s) may approve funding for individual projects. The National Partnership Agreements set out Commonwealth investment priorities and outline the objectives of investment, roles and responsibilities and further conditions and requirements on the particulars of projects.

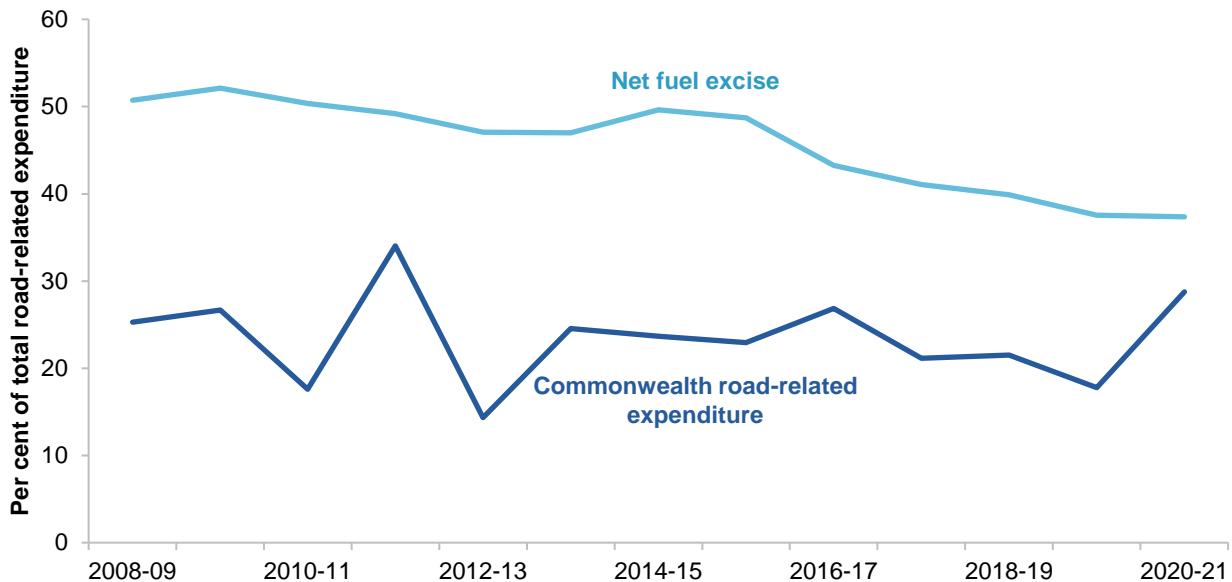
The schedules to the National Partnership Agreements constitute a considerable portion of the Commonwealth's infrastructure investment program, but do not reflect the full extent of its infrastructure investment. Further details on Commonwealth funding arrangements are outlined below.

States and Territories fund or finance expenditure with own source revenues and grants from the Commonwealth, and also provide funding to Local Governments. Local Governments fund expenditure through own source revenue (such as rates) and grants. After accounting for grant funding, final road expenditure by the Australian, State and Territory (excluding public non-financial corporations) and local governments in 2014-15 was \$4.8, \$12.5, and \$6.2 billion, respectively.

Source: PC (2017a).

Moreover, at the bowser, fuel prices are mainly determined by production costs and fluctuations in global crude oil prices (as demonstrated by price rises in 2022 stemming from the war in Ukraine), rather than the demand for local roads. The fact that fuel excise is a specific (flat) tax that is indexed by consumer prices means that as fuel prices rise (fall) relative to overall prices, the effect of fuel excise on prices at the bowser falls (rises), further disconnecting its impacts on road use. In any case, demand for vehicle fuels are highly inelastic, with a 10% increase in prices reducing demand in the long run by about 2 to 3% (BITRE 2008; Breunig and Gisz 2009; Brons et al. 2008; Galindo et al. 2015). While this makes excise a relatively efficient source of revenue, it limits its impact on road use.

Figure 2.7 – Fuel excise revenue is declining in relation to road-related expenditure
Net fuel excise and Commonwealth road-related expenditure as a share of total road-related expenditure



Source: BITRE (2021).

There are numerous problems with existing road funding and investment models. They do not limit road congestion, nor provide investment signals about where roads should be built and to what capacity. Neither do they set charges that reflect the road damage associated with vehicles with different weights on roads with different levels of resilience to damage, nor do they use a sound framework for pricing that balances efficiency, distributional concerns and meeting (some of) the fixed costs of construction.

Recognising that Australian Government excise revenue will fall with electrification of the vehicle fleet, various jurisdictions have proposed or introduced distance-based charging for electric vehicles:

- In July 2021, Victoria implemented a road user charge for all Victorian-registered zero and low emission vehicles (the ZLEV road-user charge), currently levied at 2.6 cents per km for electric vehicles and 2.1 cents per km for plug-in hybrid electric vehicles. Registered operators of zero and low-emission vehicles also receive a \$100 annual registration discount.
- The South Australian Government had proposed a road user charge for electric vehicles, which was withdrawn in 2022 following a change in government.
- New South Wales will introduce a road user payment for eligible EVs from July 2027 or earlier if electric vehicle (EV) sales reach 30% of new vehicle sales. The payment will be equivalent in real terms to 2.61 cents per km for battery or hydrogen cell EVs, and 2.088 cents per km for plug-in hybrid EVs.

The Australian government and other parties have claimed that the form of these EV road-user prices make them equivalent to excise taxes, which, under the Constitution, only the Australian Government can collect. In October 2022, the Australian Government filed an intervening submission with the High Court case of *Vanderstock & Anor v. The State of Victoria*, arguing that:

The Zero and Low Emission Vehicle Distance-based Charge Act 2021 (Vic) (ZLEV Charge Act) imposes a tax on goods: specifically, on zero and low emission vehicles (ZLEVs). The tax (ZLEV charge) is calculated by reference to the quantity of the consumer's usage of a ZLEV. It imposes an excise, and is therefore invalid. (paragraph 6)

The focus of this section is on the economics of road-user charging and should not be read as a comment on the constitutional legality of current road user charges. Nevertheless, if the High Court decision makes it impossible for states to unilaterally collect set per kilometre charges, then the Australian Government will need to be a party to any trials by state and territory governments of road user charging for any vehicle, regardless of their fuel type. Ultimately, some degree of cooperation across the federation will be needed given the Australian government's primary role in funding the National Highway and interstate travel on ordinary roads.

The next steps toward the implementation of road-user charges will involve challenges in policy design (discussed below), including how charges might limit road congestion and road damage, meet distributional objectives and raise revenue.

Per kilometre charging?

Putting aside congestion charges, the dominant suggested model for road pricing is a fixed charge per kilometre travelled regardless of where that travel occurs in a city. This is a simple system with many practical benefits — it is easy to explain to consumers, is readily accommodated by annual odometer readings and could be implemented relatively rapidly once public acceptance increases. The fairness issues that would arise were EVs to be exempt from making any contribution to their road use and the fact that the only immediate option for recovering costs from them would be distance-based charging suggests that road user charges will become normalised for all road users. There would be a need for some offsetting reduction in existing fuel excise, though some additional charge could potentially be levied relating to environmental impacts of emissions that are not being addressed in other ways (such as a carbon pricing mechanism).

However, there are disadvantages from simple distance-based user charges, particularly their efficiency as a pricing mechanism.

Efficient pricing would set charges as close as possible to the marginal (or incremental) costs of a journey. For non-congested roads, the incremental costs of road use are close to zero for light vehicles, so imposing a charge will inefficiently reduce valuable journeys.³⁵ (Of course, the same problem also occurs for fuel excise since its costs relate to overall use, not to the marginal costs.) In contrast, for congested roads or where vehicles cause road damage, efficient prices will often need to be high (see below).

An issue confronting policymakers is that pricing that only related to marginal costs would recover only a portion of the revenue needed for road construction and maintenance, which would have to come from other sources. Municipal rates would be one option for road funding within Australia's biggest cities as it is a relatively efficient tax and reflects that most households benefit from road access.

However, were that option to be rejected, distance-based charges could provide a second-best revenue source (with additional charges imposed for congested routes and vehicles that damage roads). The degree of inefficiency of distance-based charging as a source of revenue depends on the responsiveness of distance travelled to road user charges. Since excise taxes act as a crude form of distance-based charging, the extensive literature that shows that fuel price increases have small effects on road use suggests that motorists are also likely to be relatively insensitive to at least modest distance-based fees. Accordingly, distance-based charges may be more efficient than general revenue for funding the fixed costs of maintenance and road construction. Experimentation with distance-based pricing, starting at modest prices akin to the Victorian model described above and raising them slowly, would be a way of assessing demand responses and the efficiency of

³⁵ Some other costs are associated with distance travelled — such as noise, tyre particulates, emissions, and accidents. In most instances, road user charging is not the most targeted or efficient policy approach to these problems, though an *incidental* impact of some forms of user charging will be to reduce them (Croci 2016; Gibson and Carnovale 2015; Singichetti et al. 2021).

collecting revenue this way. Emerging evidence from cities that have introduced some form of user charging, like Stockholm, London and Milan, also provides some lessons (Crocchi 2016).

It is inconceivable that distance-based charges could go far in recovering costs in less busy regional and rural roads. In that context, governments will have to continue their role of providing funding through other means.

A supplementary approach to distance-based prices would be the addition of a fixed charge to contribute to the fixed costs of road construction and use. Existing vehicle registration, insurance costs and licence charges are already in this form and were about 80% of the revenue collected through net excise taxes in 2020-21 (BITRE 2022). That charge may not be at the optimal level, which should take into account the effects on vehicle ownership. Governments could also give consideration as to whether compulsory third party insurance should be folded into distance-based charges as risks relate to distance (Litman 2011). In the interim, maintaining fixed charges roughly in line with existing fixed charges may be a prudent approach, but with longer-run charges taking into account their impacts on vehicle ownership. This may increase or decrease the share of road costs recovered through fixed charges.

One option that could be considered is a menu option for motorists, who could choose a lower fixed cost and a higher distance-based charge. For road users that value car use, but mostly for shorter trips, this would be more efficient than a high fixed charge that discouraged them from vehicle ownership at all. This may be particularly attractive for elderly people for whom vehicle ownership provides considerable autonomy.

How road user charges could help to address congestion

While congestion has long been a concern for governments (figure 2.8), recent trends suggest that congestion costs will be increasingly important.

- The rise of working-from-home arrangements during and after the pandemic has led to changes in urban travel patterns (PC 2021h). To some extent, this has the potential to reduce congestion on routes previously used by commuters. However, more recent data suggests that COVID-19 strengthened preferences for car travel over other modes; and congestion in many cases returned (or exceeded) pre-COVID levels, including in suburban routes.
- Given that Australia's borders have reopened following the lifting of the restrictions associated with the COVID-19 pandemic, net overseas migration has shown signs of rebounding. This will increase city growth, and depending on additional infrastructure spending, will aggravate congestion.

Charges during peak times or on heavily congested routes reduces urban congestion (PC 2017a, 2021c) by limiting trip numbers or diverting travel to other times or other transport modes that have fewer impacts, such as walking and public transport. It could also raise additional funds for the maintenance of roads with high usage and signal the need for more capacity. There are varying forms of congestion charges, including:

- central business district 'cordon' charges, which suits cities where congestion is mainly caused by predictable commuter traffic into a central area (as used in London and Singapore)
- corridor charges, where drivers are charged based on how far they travel along congested arterial roads and freeways in the peak direction.

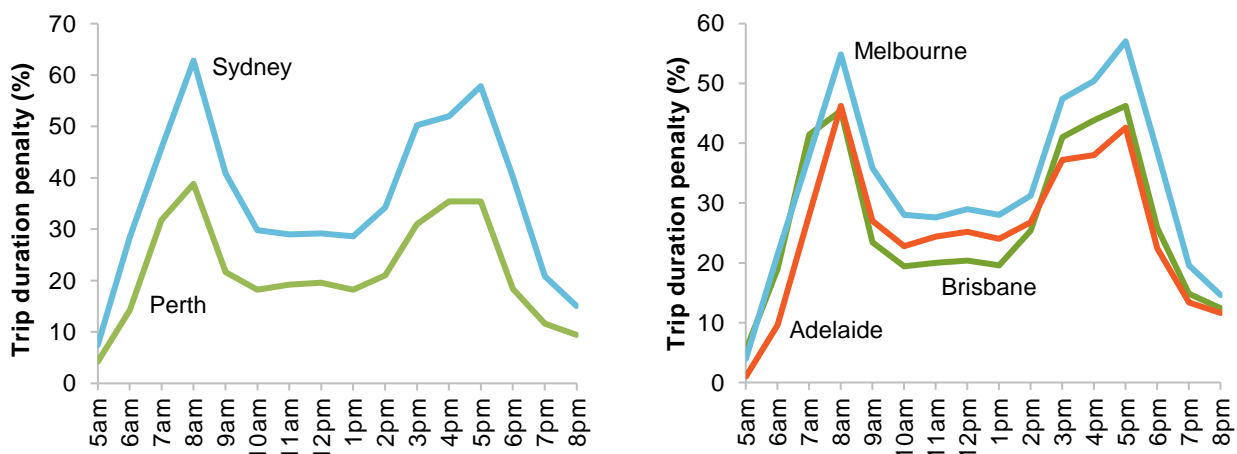
Aside from road user pricing, there are several levers that can be used to address congestion, although they vary in their efficiency. For instance, subsidies to public transport can make mass transit more attractive as an alternative to car use. However, without proper calculation of social marginal cost (and the implementation of effective concessions systems) such subsidies tend to be regressive and costly (PC 2021c). Well-designed parking levies, on the other hand, could be more efficient — a 10% increase in parking charges reduces car use by between about 2 and 13 times more than the reduction achieved by a

10% decrease in public transport prices. In either case, road-user charging would be more effective in directly targeting roads and routes that experience avoidable congestion.

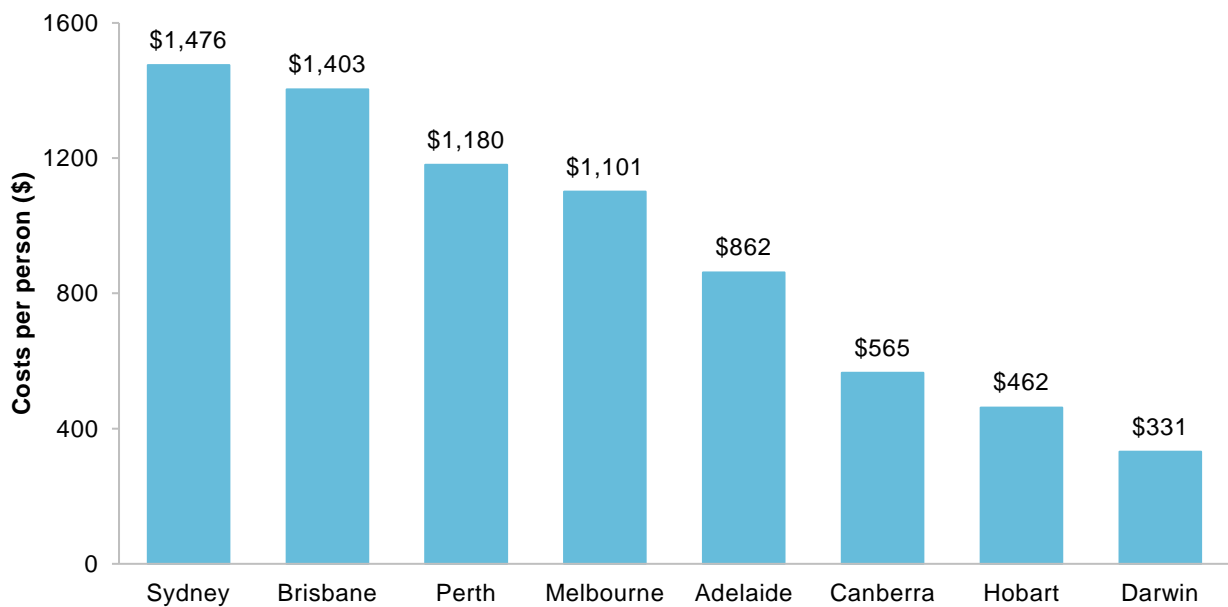
At this stage, there has been limited use of road user charging to reduce congestion. For instance, motorists using Sydney Harbour Bridge face a peak charge (implemented as an addition to the existing toll). A key step would be expanding the use of congestion charges, taking account of the need to avoid diversion of traffic from trunk roads to other roads — which could merely shift congestion. Since it would be difficult to implement congestion charges any time soon across a whole city, planning and modelling will need to inform the roads subject to it, and the optimal period and level of charges will require some experimentation.

Figure 2.8 – Costs of congestion in Australian cities

a. Impacts of congestion on travel time, 2019



b. Avoidable social costs of congestion (per capita), 2019-20 (2018-19 prices)



Source: PC (2021c).

Heavy vehicles

As noted above, existing registration fees excise for heavy vehicles already have explicit links to road use. However, there are sound rationales for also moving to distance-based charging, taking into account damage to roads and any other external impacts that their use entails. A small-scale trial indicated that the systems and technology to achieve heavy vehicle distance-based charging is feasible and demonstrated that some trucks would pay less under that model (DITRDC 2020). Further, large-scale trials are underway (DITRDC 2022).

Other models of pricing

Starting simple is the clear policy imperative. In the shorter-term, a viable road funding model could comprise:

- a flat distance-based charge plus a fixed charge (such as registration), as these are relatively efficient ways of raising revenue to help recover construction and maintenance costs
- supplementary surcharges to cover the marginal costs of road use associated with congestion and heavy vehicle road damage, which would also contribute to road funding
- general revenue to meet the community service obligation to fund roads in regional and remote areas, reflecting that the above mechanisms could only realistically fund a small fraction of total costs.

However, over the longer run, distance-based charges could vary depending on the nature of the road (such as its road surface quality and vulnerability to damage) and its location. In principle, more cost recovery could occur on road segments or at times that demand was very unresponsive to pricing.

Distributional issues

Road user charging has some distributional consequences, though these would not be great were distance-based charges to be close to the charges that are implicit in fuel excise. Indeed, given EVs and hybrid vehicles are largely purchased by those on higher-incomes (Mitchell and Monterosso 2021), the effect of standard distance-based charges may be progressive compared with current road funding models.

The distributional consequences of any congestion charge are unclear and will depend on empirical evidence from overseas and experimentation. In Cardiff in Wales (UK), congestion charges had a regressive impact, though better public transport provision could offset that (Santos and Caranzo 2022). That option aside, it may be possible to have concessional congestion charges or other approaches for given travellers. For example, in London, reimbursements for congestion charges are available to charity workers, aged care workers, and volunteers, while discounts are available to and people with a disability (Transport for London 2023).

Road funds

The Commission has already spelt out how road funds could better connect revenue collected from motorists to investments — a key missing element in current arrangements, which rely on planning and politics (PC 2017d, pp. 132–142). The main element of this approach is hypothecation of road-related revenue into funds dedicated to construction and maintenance of roads, with investment decisions guided by revealed preferences by motorists about the infrastructure they value most. This more market-based approach to investment is less likely to lead to poorly-based investment decisions.

Any such road funds should commence with trials to build consumer and political confidence that they will achieve their intended benefits.



Recommendation 3.5

The next steps toward road user charging

Australian governments should work towards an intergovernmental agreement on road user charging for all vehicle types, focusing on distance-priced charging including any road damage premiums, and subsequently, incorporating congestion charges for crowded roads. The agreement should set out the roles of the different level of governments, how road funds and trials should be implemented, and the appropriate transition pathway away from fuel excise.

In developing a new pricing regime, Governments should consider the inclusion of compulsory third party insurance costs in distance-based charges and menu options for motorists to choose between higher distance-based charges and lower fixed charges.

The appropriate level of distance-based and fixed road charges, and the desirable extent of exemptions and concessions, should be based on trials and the experiences of overseas jurisdictions that have already employed them.

Ultimately, governments should work towards the longer-term objective of more efficient pricing of road use, including through the use of congestion charging in urban centres.

Public transport infrastructure and service provision

Public transport involves public funding of service operation, of capital goods (such as trains and buses), and of public infrastructure (such as additional bus lanes and rail networks). As the Commission (2021c) has outlined previously, it is neither likely nor desirable for fare revenue to recover the full costs of public transport and infrastructure. This reflects that public transport is a human service that aims to provide affordable transport for most Australians. Moreover, the average price required to recover the very high fixed costs of transport network would be well in excess of the incremental cost of a trip, leading to inefficiently low levels of demand. The adverse demand effects of average cost pricing would make it difficult to have a viable public transport system. Moreover, fare settings should also recognise the positive social benefits of public transport — such as reduced road congestion, environmental benefits, and mobility for people who might not be able to access private transport.

Setting fares with reference to social marginal cost (as opposed to average cost) focuses on efficient use and provision at the margin. Managing the usage of public transport can have significant implications for investment in network capacity, as noted by Infrastructure Victoria (2020, p. 8):

... an overused network with crowded train carriages should be priced higher to reduce over crowding and help fund new infrastructure to be installed to allow for more trips (i.e. the social cost of adding extra trips is high), while an underused network with empty trains should be priced low to encourage greater use of the existing network (i.e. the social cost of adding extra trips is very low).

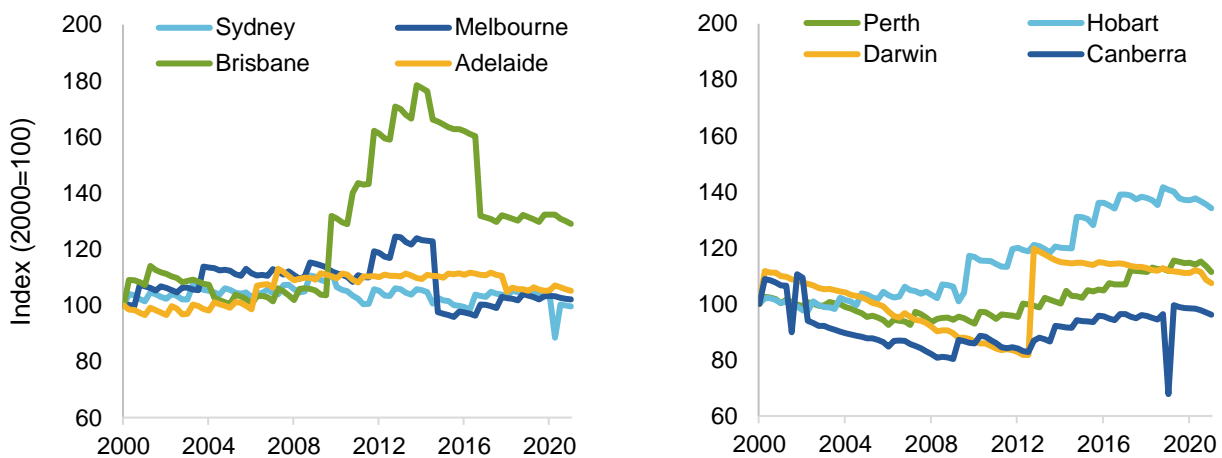
While cost-benefit analysis serves an important role in assessing whether large investments are likely to be economically justifiable, setting fares according to social marginal cost is an important complementary measure — not only to avoid inefficient expansion (or under-investment) in public transport networks, but to ensure that public transport provides social and economic benefits. Such pricing takes into account the mode of travel (for example, trains, ferries, trams or buses), distance, and time of use, among other factors.

For the most part, public transport fares are not set in accordance with the calculation of social marginal cost. Rather, they are typically based on historical settings, with very low rates of cost recovery (including for those on higher incomes travelling at peak times). Increases are often avoided for political economy reasons, and overall fares have remained stagnant in real terms (figure 2.9). Many jurisdictions have offered some

services for no charge, when better outcomes for passengers would be achieved by using these forgone funds to improve the quality of public transport services.

More sophisticated approaches to setting fares and subsidies could more better address both equity or efficiency goals. One such approach to pricing developed by the Independent Pricing and Regulatory Tribunal has been operational in New South Wales for some years (PC 2021c, p. 18), while Infrastructure Victoria has undertaken considerable research on pricing reforms (Infrastructure Victoria, sub. 10, p. 1), though this is not yet reflected in policy.

Figure 2.9 – Fares have remained stagnant in real terms
Public transport price indexes, 2000–2021



Source: PC (2021c).

No other jurisdictions have moved to more sophisticated approaches, but others could copy the essential elements of pricing that IPART has developed. Moreover, jurisdictions could improve institutional arrangements for public transport fare setting by:

- publishing a long-term strategy for fare setting with explicit rationales for fare decisions
- retaining real fares by increasing fares annually by at least the Consumer Price Index (if not already customary) and, probably more desirably, growth in public transport costs
- publishing the expected impacts of fare reforms, including any distributional results
- holding open consultations with stakeholders
- periodically instituting holistic reviews. (PC 2021c, p. 18)



Recommendation 3.6

More efficient public transport fare settings

Public transport fares across all states and territories should apply the pricing framework used by the NSW Independent Pricing and Regulatory Tribunal, including consideration of fares that take into account peak-time crowding, reduced road congestion, distance-based charges and fares that reflect the lower costs of buses compared with trains.

States and territory governments without independent bodies to make jurisdiction-specific recommendations should improve fare setting through other channels, such as publishing pricing strategies and rationales for decisions, and increasing fares annually by growth in public transport costs.

3. Openness to trade and foreign investment

Key points

- * International trade and investment will be critical for driving future productivity growth and building economic resilience.**
 - Trade in goods and services and foreign direct investment (FDI) are key sources of competitive pressure for domestic firms and important mechanisms for facilitating the diffusion of knowledge and innovation. The benefits of openness in shaping Australia's economy have been evident over many decades.
 - Supply chain shocks and global upheaval do not diminish the case for openness. Indeed, as a small advanced economy, increased global linkages are likely to be the best way for Australia to build resilience to deal with global uncertainties.
- * Australia's FDI screening regime should properly account for national security concerns, but care should be taken not to disincentivise investment.**
 - Application fees for foreign investors are increasingly being used as a tax base. There are limits to which such taxes can be used without affecting the supply of FDI into Australia.
- * Removing residual tariffs would reduce costs to importing firms and consumers and assist more advanced production processes that form part of global supply chains.**
 - Australia's tariff regime provides little protection to domestic firms. Tariff revenue is likely already outweighed by compliance costs to importing business, and this will increasingly be the case as preferential trade agreements proliferate.
- * Trade in services is likely to be increasingly significant for the advancement of productivity.**
 - Growth of trade in services stems from the advancement and proliferation of technology, as well as rising incomes among Australia's trading partners. Barriers exist both 'at the border' and 'behind the border'.
 - There are multiple policy and regulatory levers that would help Australia participate in the global growth in trade in services, including improvements to migration and FDI policy settings, and licensing regulations.

3.1 Introduction

Australia's openness to trade and foreign direct investment has increased over several decades and has been a major force in shaping the economy (box 3.1). This process has been associated with sustained contributions to living standards, predominantly through their role in promoting competition and resource efficiency, innovation diffusion and, thereby, productivity growth.

As a small, open, advanced economy, trade and foreign investment will continue to shape Australia's exposure to competition and innovation. Both will influence the structure of Australia's economy. The state of global trade and investment will be an overarching determinant of productivity growth in both the short and long term.

While there are a great number of exogenous, international factors that are beyond the scope of Australia's decision-making, the Australian Government has relatively direct levers to determine the settings for trade and investment. How these levers are deployed in four key policy areas will have direct implications for productivity:

- Australia's overall approach to global trade and investment. Heightened global uncertainty has led to pressures for the Australian Government to intervene to bolster self-reliance. But decisions to intervene would bring their own risks and must be weighed carefully against the efficiency gains of openness — in practice, direct interventions would rarely be justified (section 3.2).
- Regarding merchandise trade, more open settings (globally) would improve productivity by allowing Australian exporters to access larger markets while decreasing the costs of imported inputs for domestic industry (section 3.3).
- Foreign direct investment introduces both competition and innovation to Australian markets but can also bring national security risks. Balancing the benefits and risks is challenging (section 3.4).
- As an advanced economy capable of delivering sophisticated services, the ability to trade services globally will help to shape Australia's productivity in the longer term. In the decade prior to the COVID-19 pandemic, Australia had only begun to participate in increasing global trade in services, often facilitated by digital technologies. Policymakers will need to be attuned to the impact of trade and investment settings, and 'behind the border' measures on Australia's services trade prospects (section 3.5).

Box 3.1 – Trade and foreign investment have shaped Australia's economy

Trade and foreign investment have been key drivers of the structural shifts in Australia's economy over several decades, which have allowed production to specialise in areas of comparative advantage, bringing substantial national income gains.

- Trade policy settings underwent significant reforms across the second half of the 20th century, resulting in a dramatically more open economy. While significant tariff reductions were implemented in 1947 (reducing tariffs to a rate of 30%) and 1973 (reducing most tariffs by 25%), the successive reforms between 1986 and 2010 brought tariffs to their current, historically low levels (below 5% on average). The effective rates of assistance to manufacturing and agriculture sectors declined accordingly over the long term (figure below, panel d).
- Similarly, Australia's foreign investment policy settings have been significantly reformed since the 1980s, increasing the role of FDI in Australia. Australia receives more foreign investment than it sends out, and in the past decade in particular, the growth of foreign investment has helped make up for declining levels of domestic investment. In the past 20 years, FDI has favoured mining, agriculture, and property (figure below, panel a).

Box 3.1 – Trade and foreign investment have shaped Australia’s economy

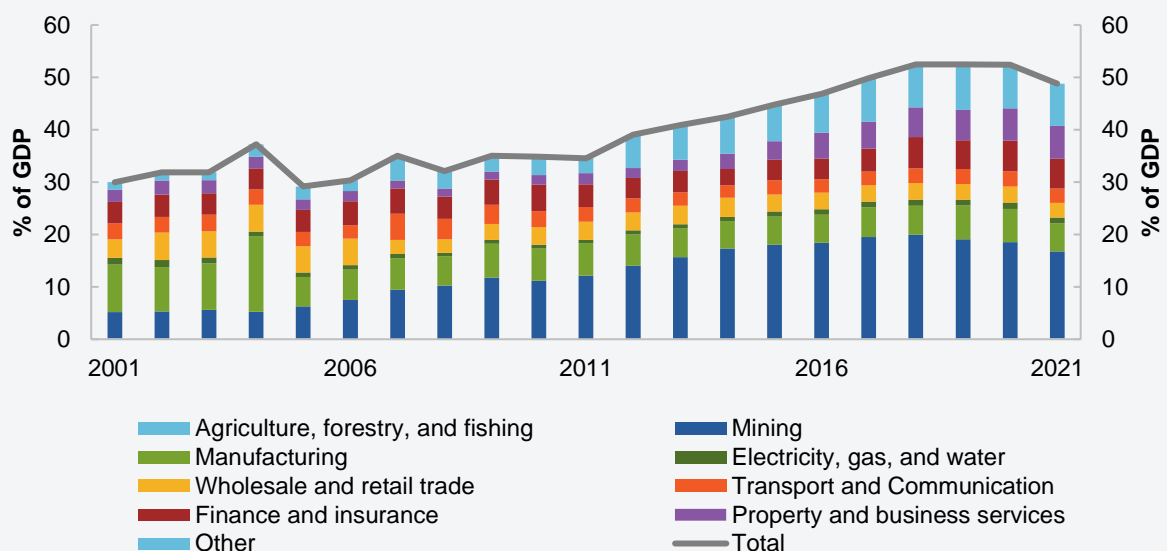
- As Australia opened up to international competition and investment, this helped drive structural change in the industrial composition of the economy (figure below, panels b and c). Since the early 1980s, Australia’s exports have been dominated by mining, as the share of agricultural and manufactured exports declined.

Australia is also party to a number of regional and bilateral trade agreements, which largely proliferated well after the major waves of unilateral tariff reductions. Australia has 17 such agreements in force, 11 of which were implemented in the past decade (DFAT 2022a). Australia has signed bilateral agreements with all of its major trading partners — about 90% of Australia’s imports will be covered by preferences once agreements with the United Kingdom, European Union, and India are implemented (PC 2022d).

Global trade has also expanded over the long term, as production and supply chains have become more interdependent. Today, international trade is increasingly characterised by global value chains that are geared towards the production of components that are on-sold to other countries for further value-adding or processing. This has resulted in significant efficiency gains to producers both globally and in Australia.

Openness has been an integral part of Australia’s development into an advanced service-driven economy, and indeed has become Australia’s default setting.³⁶ Some of the benefits of open trade and investment have accrued over many years, as resources have shifted between sectors (i.e. away from manufacturing and towards services) and within sectors (e.g. towards more efficient areas of agriculture and higher-value manufactures).

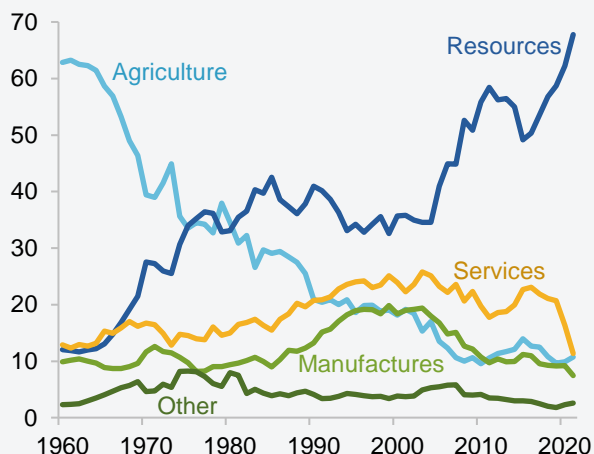
a. Foreign direct investment has increased particularly in some industries



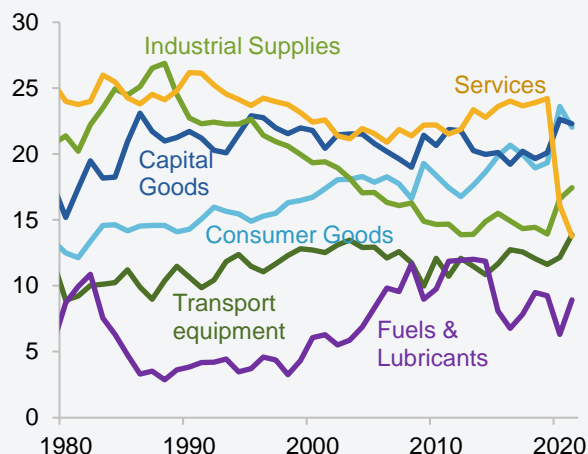
³⁶ For example, there is evidence to suggest that the productivity growth experienced by Australia in the 1990s can be linked with the preceding microeconomic reforms, including significant trade liberalisation (Parham 2004; PC 1999).

Box 3.1 – Trade and foreign investment have shaped Australia’s economy

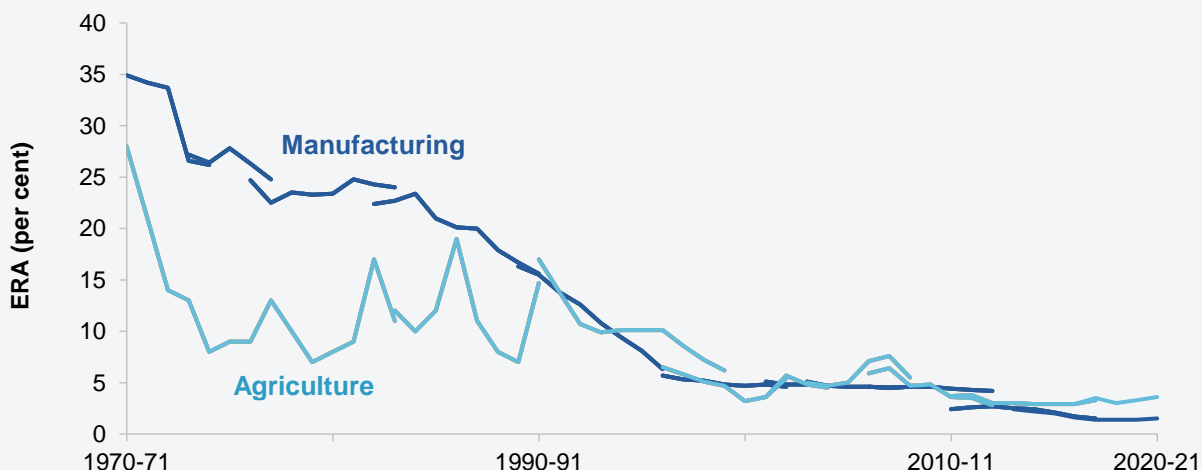
b. Composition of exports (share of total)



c. Composition of imports (share of total)



d. Effective rates of assistance have declined over several decades



Source: PC (2022f, 2022b).

3.2 Building trade resilience

The integrated nature of the world economy has implications for how risk and uncertainty are spread. Disruption to production in one country affects others in the global supply chain. Breakdowns in trade between two countries can have various implications for trading partners. Trade itself can spread some forms of disruption, particularly where it relates to biohazards or disease.

At the same time, global trade has changed the way risks are managed. For instance, trade is a way of diversifying risk, such as where imported goods can make up for sudden shortfalls in domestic supply. International cooperation and trade can help the development and diffusion of scientific responses to biohazards or disease.

The double-edged nature of more open trade has been highlighted by the emergence of new sources of uncertainty in the past five years, including trade tensions, geopolitical events, and a worldwide pandemic — all of which are continuing to some degree (box 3.2). As a result, questions have arisen about the future of global trade, both for Australia and internationally.

Box 3.2 – Major sources of trade uncertainty in the past five years

The impact of COVID-19 on trade

The first two years of the COVID-19 pandemic led to widespread interruptions to economic activity. Despite recessions occurring in many countries, the negative effect on merchandise trade was relatively muted. Australian imports of consumer goods, for instance, quickly rose beyond pre-COVID levels. Between late 2019 and early 2022, Australian households maintained relatively stable consumption of essential goods, even increasing their consumption of discretionary goods (due to increased time at home and the lack of available services such as travel) (ABS 2022a).

Protectionism and trade disputes

While protectionist sentiment arises from time to time in many countries, one of the more globally significant episodes occurred between 2017 and 2021. Trade policy settings were in flux between the world's two largest economies — the United States and China.

Australia and China have also experienced flux in trade policy settings, with China implementing a series of trade measures in 2020 specific to Australian exports (PC 2021g), including:

- anti-dumping tariff of 73.6% and countervailing duty of 6.9% on barley; and a tariff of up to 212% and countervailing duty of up to 6.4% on Australian wine
- suspension of imports from four Australian abattoirs due to mislabelling of products and health certificate requirements; suspension of relations with Australia's largest grain exporter, CBH, and another grain handler, Emerald Grain due to claims of weed seeds in a consignment
- preventing ships from unloading their cargoes citing quality reasons. Customs delayed quarantine inspection causing live lobsters to die at airports
- progressively suspending timber imports first from Queensland, then from Victoria, South Australia and Tasmania.

The incapacitation of the WTO Appellate Body has made it more difficult for dispute appeals to be heard and resolved (PC 2022f, p. 61). As an interim measure, an alternate body has been established by a subset of WTO members (not including the United States).

Trade bans caused by domestic shortage

Export bans have also been implemented in countries in order to manage price increases caused as domestic demand increases. Such bans are designed to protect domestic consumers from inflation, by forcing domestic producers forego higher prices on the international market.

Recent examples include Malaysia's ban on chicken exports (in response to supply shortages) and China's global ban of urea exports (in response to domestic demands for fertiliser) (Lin and Chu 2022). The latter caused shortages in the diesel exhaust fluid AdBlue.

Box 3.2 – Major sources of trade uncertainty in the past five years

Geopolitical influences on trade

In early 2022, the onset of war in the Ukraine led to disrupted trade, particularly in food and energy (Ruta 2022). And while the energy shortages were felt most sharply in Europe, Australian fuel prices were also affected. The combination of the invasion of Ukraine; a lack of supply boost from OPEC; and the ‘post-COVID’ recovery in global demand for oil, resulted in retail fuel prices reaching their highest levels since 2014 (ACCC 2022e).

Trade and the climate transition

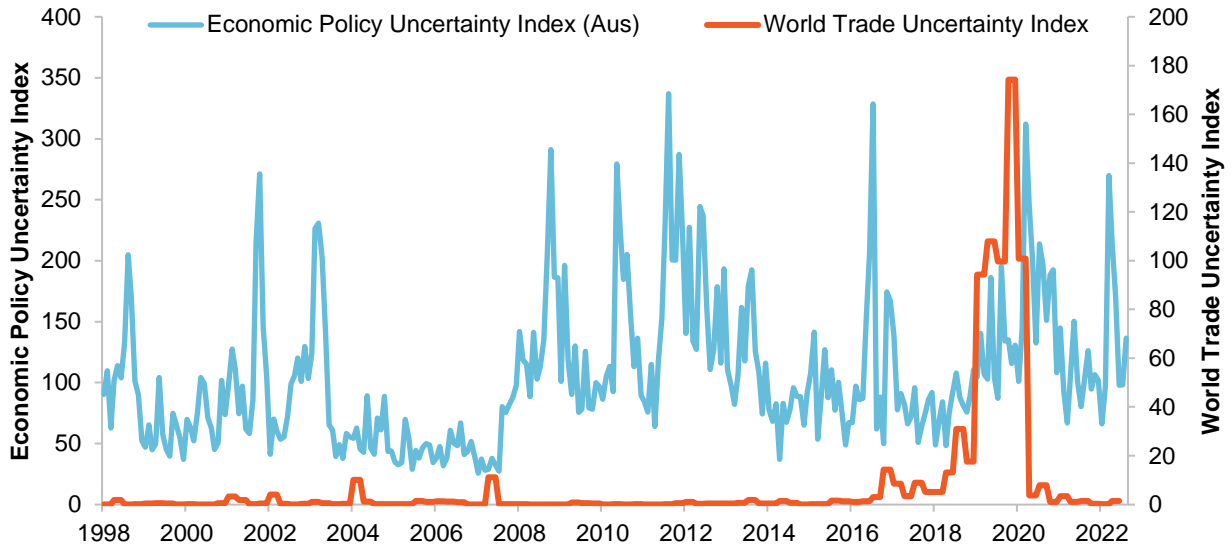
Other potentially significant developments are still in train, such as the potential for carbon border tariffs to be implemented in Europe and elsewhere. If the EU’s Cross Border Adjustment Mechanism (CBAM) is implemented as currently proposed, it is likely to impact a relatively small number of Australian exporters (PC 2022f, p. 82). Greater costs could be levied on Australian exporters if similar carbon tariffs are adopted by Australia’s main trading partners.

Global trade has been resilient to disruptions and vulnerabilities

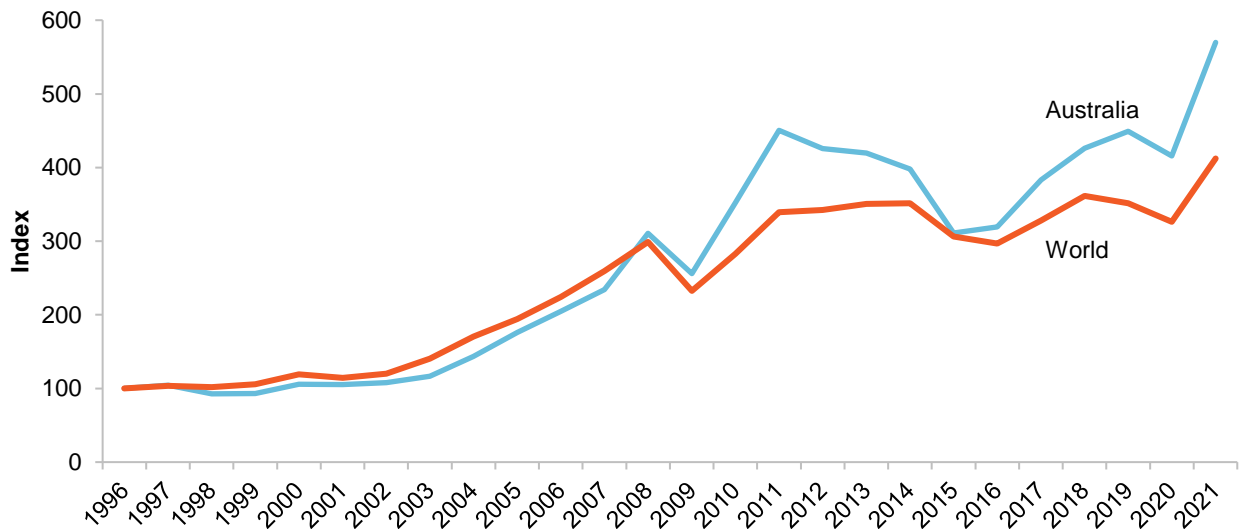
At a high level, evidence suggests that global trade flows have not diminished despite heightened uncertainty. Text-based indices of uncertainty show that the discussion of economic and trade uncertainty spiked during the trade tensions between the United States and China in 2016, and at the onset of the COVID-19 pandemic in 2020 (figure 3.1, panel a). In both cases, the resurgence of trade (both globally and for Australia) is suggestive of its central role in how nations manage major disruptive events. Moreover, in practice, the relationship between uncertainty and trade is not straightforward: the extreme uncertainty brought on by the global pandemic was less damaging to trade than the trade tensions in 2017, particularly for Australia (figure 3.1, panel b). This suggests that trade disputes — effectively, policy and regulatory risks — can provide the most significant shocks to trade itself.

Figure 3.1 – Trade tensions and COVID-19 caused significant trade uncertainty

a. Measures of uncertainty based on text mining



b. Global trade in merchandise



a. The World Uncertainty Index (WUI) and the World Trade Uncertainty Index (WTUI) are quarterly indices based on text searches. They are based on frequency counts of the word ‘uncertainty’ and its variants (and for the WTUI, uncertainty in related to trade) in the quarterly Economist Intelligence Unit (EIU) country reports of 143 countries from 1996 onwards. **b.** The Economic Policy Uncertainty Index for Australia is based on text archives for eight major Australian newspapers from January 1998 onwards, and is comprised of the number of articles containing the terms ‘uncertain’ or ‘uncertainty’, ‘economic’ or ‘economy’, and one or more policy-relevant terms: regulation, ‘Reserve Bank of Australia’, RBA, deficit, tax, taxation, taxes, parliament, senate, ‘cash rate’, legislation, tariff, war.

Source: Ahir, H, N Bloom, and D Furceri (2018 Updated to Q2 2022); WTO (2022b).

In addition, recent evidence suggests that the nature of globalisation is changing, with a greater role for services and intangibles. McKinsey (2022) note that:

Flows of services, international students, and intellectual property grew about twice as fast as goods flows in 2010–19. Within services, flows of knowledge-intensive services — including professional services, government services, IT services, and telecommunications — are growing the fastest.

Indeed, IT services and data flows peaked during the pandemic, enabling remote work and operation in lieu of transport, and contributing further resilience to the global economy (McKinsey Global Institute 2022). This would suggest that just as the global economy became more interconnected through more complex supply chains, so too has global integration increased with technological progress and in response to COVID-related disruptions.

At the same time, the experiences of recent years have highlighted potential vulnerabilities in Australia's supply chains and the importance of 'economic resilience'. Several conceptualisations of resilience are relevant to Australia's productivity. The Commission has considered a 'resilient supply chain' as one that continues to function when exposed to shocks and adapts to changes (PC 2021g, p. 36). Others similarly define economic resilience as the capacity to 'resist a particular shock and to recover rapidly to the previous level of growth or better' (Goetz, Fleming-Muñoz and Han 2016) or to 'prevent and prepare for, cope with and recover from shocks' (WTO 2021, p. 7).

In many cases, individual market participants have a comparative advantage in addressing supply shocks and dealing with resilience. Thus, when vulnerabilities in supply chains and markets often arise — and are resolved — without government intervention. For instance, 'just in time' production processes help firms minimise the costs associated with inventory, but can increase vulnerability to supply interruptions (PC 2021g; Stiglitz 2022). If multiple competing firms operate with similar processes, this raises the level of vulnerability at an industry level. As firms manage risks in their own self-interest, including through changes to sourcing, inventory, and production processes, this reduces vulnerability. The policy questions are: whether market failures exist in the provision of resilience; the source and characteristics of such market failures; the extent to which policy can directly address those failures; and whether the benefits of intervention exceed the costs.

Even where such vulnerabilities do not relate to critical or essential goods, they can be relevant to productivity levels — particularly of the market sector. This raises questions regarding the role for government: namely, should government help avoid vulnerabilities altogether through trade policy; and to what extent should governments intervene in how vulnerabilities are managed.

This section considers the economic costs and benefits of different policy approaches. Notwithstanding the vital importance of rigorous analysis and evaluation of strategic concerns relating to geopolitical issues and national security, this section does not include an analysis of those issues.

An era of trade resilience

Calls for 'onshoring' are a common response to global shocks. It is a truism that reliance on domestic production might avoid the risks associated with trade. However, it would involve its own risks, as well as forgoing the significant and ongoing mutual gains from trade. As discussed above, this not only affects the variety and costs of products and inputs, but also has implications for specialisation throughout the economy. Indeed, global trade can help build resilience to domestic events that might otherwise disrupt the economy.

While an absolute retreat from globalisation is unlikely, in recent years countries have increasingly been deliberately shaping their trade flows and implementing new forms of protection. For instance, the United States' 'friend-shoring' approach to strengthening supply chains will involve 'partnering with allies' (New Zealand Foreign Affairs and Trade 2022) — effectively biasing trade in favour of nations sharing geopolitical ties. The US Treasury Secretary noted that:

Working with allies and partners through 'friend-shoring' is an important element of strengthening economic resilience while sustaining the dynamism and productivity growth that comes with economic integration. Friend-shoring is about deepening relationships and diversifying our supply chains with a greater number of trusted trading partners to lower risks for our economy and theirs. (Yellen 2022)

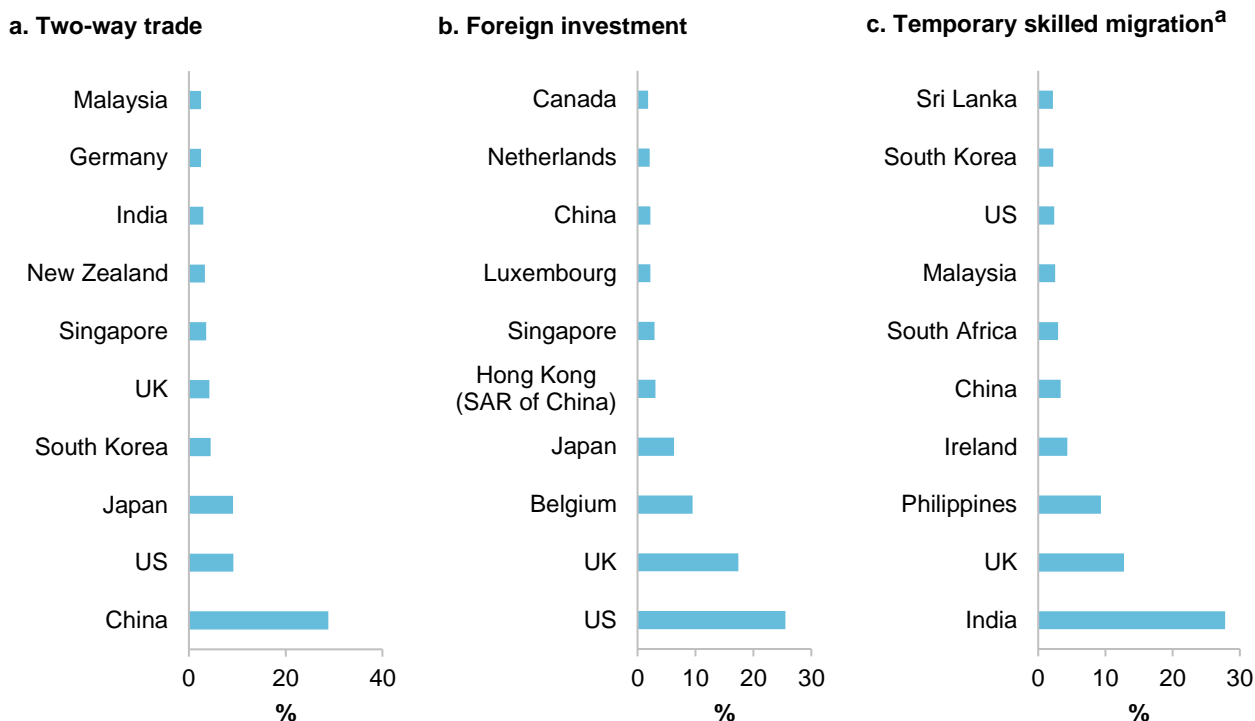
Governments could implement a range of restrictions or incentives to influence firms' choices of foreign suppliers, and while this still realises some gains from trade, its distortionary effect is a risk to productivity both in Australia and globally. To the extent that businesses are incentivised (or forced) to purchase goods at higher cost or lower quality than would have otherwise been the case, this would effectively re-shape supply chains to favour less efficient firms. The implications for productivity would increase, the more broadly such actions were applied.

If Australia were to make such shifts in trade patterns, the economic implications would be shaped by Australia's economic relationships (across multiple dimensions) and place in the global economy. For instance, trade patterns are determined, in large part, by geographic proximity. About 65% of Australia's two-way trade was within Asia³⁷ — among relatively large economies with rising incomes (figure 3.2). Influencing markets to shift trade away from the region would likely entail substantial efficiency losses, many of which would ultimately be borne by Australian households in the form of higher prices and lower real wages, lower product quality and reduced product variety.

Australia's trade and foreign investment are also dominated by some of the world's largest economies, with those relationships also extending to migration (often as an export of tourism or education services) (figure 3.2). As such, strategic decisions with regard to the relationship between Australia and one of its trading partners, say in regard to the trade in goods, would likely have broader implications.

³⁷ Based on data from DFAT (2021c).

Figure 3.2 – Top ten source countries for trade, investment and temporary skilled migration
Percentage share of total inflows to Australia



a. Primary applicants granted.

Source: DFAT (2021c, 2021b); DOHA (2022).

Intervention in critical supply chains may be warranted in isolated circumstances

The Commission’s report on *Vulnerable Supply Chains* developed a framework that allowed specific policy focus on ‘critical’ and ‘essential’ goods, as well as ‘vulnerable’ supply chains (PC 2021g). The Commission stressed that managing risks of supply chain disruptions ‘inescapably entails costs on businesses, consumers and governments’ (p. 1). As a fundamental principle, the Commission concluded that risks are best managed by those with both the incentives and capacity to mitigate them. In most cases, private firms are primarily responsible for managing risks in their supply chain, and governments need to consider the potential for interventions to ‘crowd out’ efficient private sector risk management.

Government intervention may be justified in isolated cases. This may include instances when private risk management is impeded (including by taxation or regulation) or where the residual risk resulting from market decisions is out of step with public benefit. Some ongoing functions of government are critical to risk management, such as ensuring regulations allow firms adjust to major disruptions, and the promotion of a rules-based international trading system.

The policy response to a disruption will depend on specific circumstances — as exemplified by the recent shortages of urea for diesel fuel additives (box 3.3). Several actions have improved Australia’s access to diesel fuel additives, building a more resilient supply chain without moving entirely to domestic supply, nor to cease importing from particular suppliers. Neither was it necessary to adjust regulations relating to the use of diesel additives, which aim to promote environmental policy objectives.

The urea shortages also highlight that it will not be possible for governments to predict every vulnerability ahead of time. While the Commission (2021g) has provided a useful framework for identifying vulnerable

supply chains, its empirical analysis did not identify the potential issues regarding urea (owing in part to inevitable data limitations). Moreover, it will not be possible to predict every global disruption, nor stockpile for every shortage. As such, the ‘response phase’ will remain critical for policy.

Box 3.3 – A limited and pragmatic approach for diesel fuel additives

The costs associated with managing supply chain vulnerabilities – to businesses, governments, and consumers – depends on the choice of strategy. These include:

... stockpiling, diversification of suppliers or markets, contingent contracting, developing domestic capability, or tolerating the residual risk, among others. They also depend on the state of preparedness of firms and governments. (PC 2021g, p. 1)

In late 2021, China’s ban of urea exports led to shortages of the diesel fuel additive AdBlue, required for use of diesel fuels by Australian regulations. While this occurred after the publication of the Commission’s report on Vulnerable Supply Chains, the framework of that report is useful in understanding the causes, adjustments, and alternate responses to the disruption.

Preparation, response, and recovery

Different risks are better treated in different stages. While a predictable risk might best be treated in the prevention stage, a highly uncertain risk might be better treated through response and recovery.

There appeared to be relatively little preparedness among businesses or government for a urea shortage, despite the critical nature of AdBlue and the highly concentrated import market for urea.

Diversification of supply

Australia continues to import the vast majority of its urea supply. At the time of the trade ban, China was the source of a significant proportion of the global urea supply and of Australian urea imports. At the height of the shortage, supply was increased from Indonesian exporters. Australia continues to import urea from China among other sources.

Domestic supply and stockpiling

The Australian Government provided a temporary subsidy to domestic firms to restart their production of urea in order to supplement imported supplies. No government stockpiling was undertaken.

Regulatory levers

The ACCC made a ruling to allow domestic producers of AdBlue to share information and collaborate to obtain adequate supply of refined urea, in the context of shortages.

An additional regulatory lever would have involved the relaxation of requirements to use diesel fuel additives in order to reduce particulate pollution. This lever was not used, possibly due to technical complications and warranty issues it could cause for some diesel engines.

A key form of preparedness for governments will be to have processes and principles in place to guide policy responses. To this end, the recent establishment of the Office of Supply Chain Resilience will play a key role in informing government decision-making, as a source of expertise and due to its standing capabilities in monitoring. Ideally, this should involve the provision of information on the cost of measures, the likelihood of the vulnerabilities occurring, the magnitude and duration of the effects and mitigating strategies that do not

involve domestic supply. This process would benefit from ongoing development of rigorous methodologies for estimating the impacts of both vulnerabilities and interventions.

In the rare cases that call for government intervention in the management of supply chains, the policy response can take many forms. It is critical that the costs to public expenditure and to productivity are taken into account as they can be material, particularly where such assistance continues over time. Potential costs include the costs of lobbying for particular supports and their continuation, which could relieve firms from undertaking their own risk management. Any such intervention should be subject to transparent and independent review.

Building resilience through openness

A key part of building economic resilience relates to vulnerabilities in the supply of critical goods. However, even these aspects of resilience are promoted by well-functioning markets, which themselves are bolstered (however indirectly) by open trade policy settings.

First, several Australian industries have proven relatively resilient in the context of recent world events, owing to their sophistication and adaptability. For example, the Port of Melbourne has noted that the freight and logistics sector proved adaptable and agile in the context of ‘increased regulatory controls, supply constraints, elevated demand, equipment shortages, changing distribution markets etc.’ (The Port of Melbourne 2021, p. 1). Other businesses leveraged existing capital infrastructure to produce new goods or services, including spirits distilleries pivoting to commercial production of hand sanitizer (Allen 2020). To the extent that resilience is the result of businesses’ access to capital or advanced management, these are likely to be improved by exposure to foreign trade and investment.

Similarly, protection can reduce economic resilience. If a trade shock leads to shortage, domestic firms and consumers will likely experience price increases — in addition to the costs associated with any tariffs. So firms and consumers suffer the cumulative effect on prices.

Second, Australia experiences significant supply chain disruption from *domestic* events. Major weather events affect agricultural yields in regional areas and other forms of production in urban areas. Goods that are not exposed to trade (including some fresh food products) can quickly fall into shortage. Trade has proven an effective way to reduce supply risks associated with domestic shocks.

Finally, to the extent that policy and regulatory risks are some of the main global risks to trade, it is important that Australia contribute to and promote more open trade. While under certain conditions regional or bilateral trade agreements can (collectively) contribute to more open global trade, greater contributions would materialise from Australia’s participation in multi-party trade agreements and promotion of the international rules-based trading system.



Finding 3.4

Open trade and investment are key to resilience

Relative openness with regard to trade and foreign investment policy are conducive to productivity growth. Despite the presence of severe global economic uncertainty, Australia’s productivity growth is best served by more exposure to trade competition, more access to foreign direct investment, and a well-functioning rule-based system of global trade. Protectionism and industry assistance in the cause of ‘self-reliance’ would pose significant risks to productivity.



Recommendation 3.7

Pursue trade resilience through openness

The Australian Government should pursue economic resilience by harnessing open trade. Public interventions in vulnerable and critical supply chains should be considered as a last resort, given the incentives for and capacity of private businesses to manage supply chain risks. Calls for assistance in vulnerable and critical supply chains should be subject to assessment of economy-wide net benefits by the Office of Supply Chain Resilience, with some form of transparent, public reporting on the justification and/or costs of any intervention.

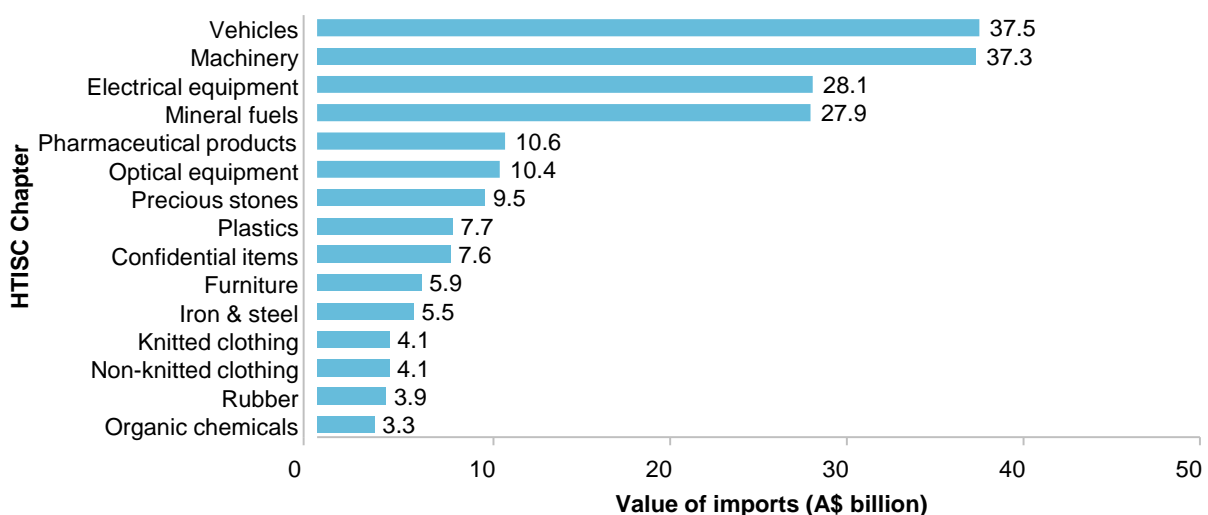
3.3 Addressing barriers to trade in goods

Both tariff and non-tariff barriers to trade result in costs for exporters to Australia and for Australian importers. The relevance to productivity is two-fold:

- Domestic firms may be less-exposed to import competition, removing a source of pressure to innovate, and leading to a misallocation of resources in the economy.
- The costs of imported inputs or capital goods can simply raise the costs of production for domestic producers, which also leads to suboptimal resource allocation (which in turn has economy-wide implications). Australia relies heavily on the import of vehicles, machinery, electrical equipment, and fuels (figure 3.3), both for final consumption and as business inputs.

Figure 3.3 – Many of Australia’s imports are productive inputs

Value of imports by Harmonized Tariff Item Statistical Codes (HTISC)



Source: PC (2021g).

The costs of tariffs

Australia’s historically low tariff levels are the cause of much less distortion to economic activity than was previously the case. However, the remaining tariffs are now responsible for a negligible amount of revenue and would offer relatively little protection to domestic producers. At face value, there is little difference between the economic costs associated with a tariff set close to zero and one set to zero.

However, Australia's system of tariffs, concessions, and preferences entails compliance costs. Businesses expend resources (time and effort) to avoid paying tariffs. In its report on the Nuisance Cost of Tariffs, the Commission (2022d, p. 45) has estimated total compliance costs were estimated to be \$0.7–2.2 billion in 2019-20 — in other words, for every \$1 in revenue raised by tariffs, the Commission has estimated \$0.60 to \$1.55 is lost in economic activity. These costs arise mainly from businesses accessing preferences under preferential trade agreements.

- In some cases, businesses will avoid the compliance costs of preferences altogether and simply pay the statutory tariff. In such cases, the benefits of preferential trade agreements in reducing trade barriers is forgone.
- This can have uneven effects across industries and types of businesses. Smaller businesses will have fewer resources to devote to accessing preferences. Businesses importing more diverse mix of products will have a more complex task of understanding multiple tariff lines, or of obtaining certificates of origin from multiple suppliers. The combination of these factors are likely to affect, for example, importers of large shipments of vehicle parts, which may comprise hundreds of different parts from different manufacturers.

Some compliance costs could also be reduced by making it easier for businesses to interface with the tariff system — a process already underway via the Simplified Trading System (DFAT 2022b). However, this process will not reduce all compliance costs. For instance, importers need to comply with the rules of origin (RoO) contained in trade agreements, which are imposed to prevent transshipment.³⁸ But as Australia has implemented trade agreements with almost all of its trading partners, this reduces the incentive for transshipment and hence the need for strict RoO.

The costs associated with RoO can be pervasive, as they include costs of producers adapting their production process to abide by RoO, while importers or exporters may need to obtain an authorised certificate of origin.³⁹ To the extent that RoO feature heavily in Australia's future preferential trade agreements (PTAs), more businesses would likely be subject to the associated compliance costs. On the other hand, if RoO were to be less stringent in future agreements (so as not to be binding on typical production processes) or if they were omitted altogether, this would significantly reduce compliance costs associated with preferences.

The compliance costs of tariffs would be avoided altogether if preferences were abolished, although this would leave Australian importers paying non-preferential tariffs instead. Ultimately, reducing tariffs to zero would be the most effective way to reduce the costs to Australian importing businesses and consumers.

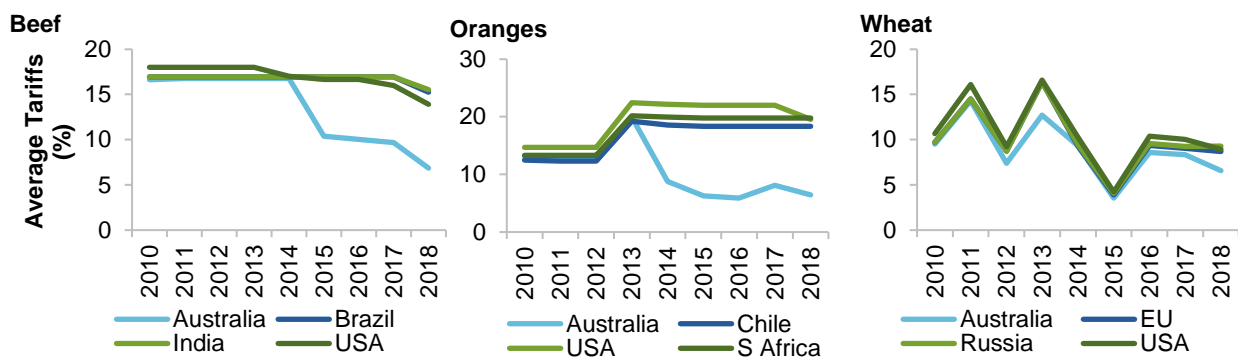
It is often argued that non-zero tariffs have inherent value in the negotiation of trade agreements. Aside from benefits to Australian importers, trade agreements remove barriers to Australian exporters operating in foreign markets. Australian firms may become more efficient when they can access overseas markets without barriers. In competing on more level terms with foreign producers in larger markets, they can be exposed to more intense competition and receive greater potential returns to innovation.

³⁸ Transshipment refers to goods being shipped via an intermediate country to the destination country in order to benefit from the PTA that the intermediate country has with the destination country.

³⁹ For instance, under ChAFTA, goods meet the rules of origin requirements if they are: 'wholly obtained' or produced from wholly obtained goods in China or Australia; or 'wholly produced' entirely in China or Australia, or both, from materials classified as 'originating' in either country under the ROO; or produced in China or Australia, or both, using inputs from other countries, while meeting the Product Specific Rule (PSR) applicable to that good (DFAT 2020, p. 7). Importers must prepare either a ChAFTA Certificate of Origin or a Declaration of Origin — the former must be issued by an authorised body in the country of origin, while the latter are only accepted for goods covered by an advance ruling and are completed by the exporter. Records must be kept for five years.

In some cases, trade agreements provide a trade advantage to Australian exporters compared with exporters in other countries (figure 3.4). For instance, when the Japan Australia Economic Partnership Agreement (JAEPA) was implemented Australia gained a tariff advantage over its competitors (such as the United States, Canada and New Zealand). However, these advantages were eroded as those competing countries signed agreements with Japan — at which point, JAEPA allowed Australian exporters to compete on equal terms with exporters from those countries (ABARES 2022, pp. 2–3). And while short-term tariff advantages benefit exporting firms, it is the longer-term effect of competition on equal terms that is likely to be conducive to productivity growth.

Figure 3.4 – Preferential trade agreements have benefited Australian agricultural exporters
Average tariff levels in Australia’s FTA markets for Australia and other exporting countries



Source: ABARES (2022).

In any case, the Commission has previously found that most gains from trade liberalisation are likely to arise from domestic liberalisation (PC 2001, p. 5). This would suggest that unilateral tariff reform should be pursued regardless of marginal effects on trade negotiations.

In addition, it is unclear to what extent tariffs are valued in trade negotiations. Indeed, the value of Australia’s remaining tariffs is likely to reflect the size of the Australian market as a share of global trade and the low rates of Australian tariffs (PC 2010b, pp. 214–216). Given the size of compliance costs associated with Australia’s tariffs, and the range of issues that are the subject of trade negotiations *aside* from tariffs, it is highly likely that the gains from domestic liberalisation of trade policy would outweigh the value of tariffs as leverage. Typically, governments do not attempt to estimate the opportunity cost of ‘holding back domestic reform to maintain negotiating coin’ (PC 2020c, pp. 11–12).

Tariff reform has only become more relevant given the state of the global economy in 2022.

- In the context of global uncertainty, building resilience in Australian industries (and the economy more broadly) would be bolstered by efforts to reduce the costs of imported inputs to production.
- Removing residual protection would improve the efficiency of resource allocation in the economy, which is increasingly important in the context of full employment conditions.
- Unilaterally reducing tariffs would send a strong message internationally in promoting freer trade, which is increasingly important where policy and regulatory risks are the main threats to trade.

Shifting focus to non-tariff barriers

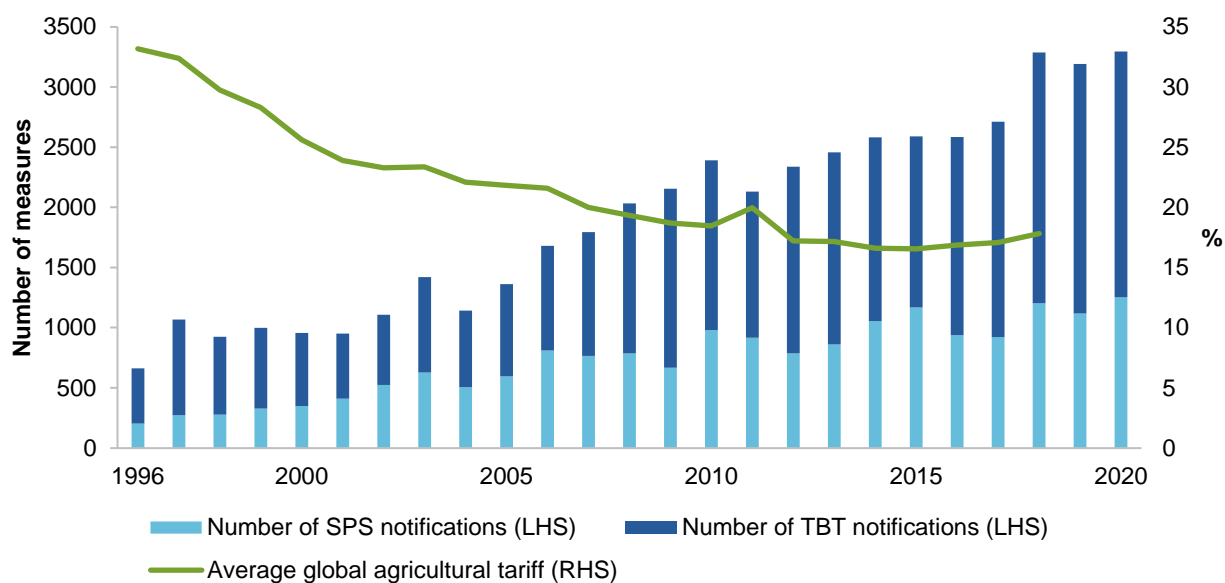
Non-tariff barriers to trade include administrative procedures or trade rules that ‘unjustifiably restrict the flow of goods and services’ (DFAT 2018). Non-tariff barriers at the border include certification and biosecurity requirements, pre-inspections, border and customs delays, product labelling, or packaging standards. Barriers ‘behind the border’ include regulatory rules, price controls, local ownership or foreign work

regulations, rules of origin, or data storage and privacy requirements. The main forms of non-tariff measures (NTMs) faced by Australian exporters are technical barriers to trade (TBT) and sanitary and phytosanitary regulations (SPS), which account for the majority of NTMs faced by agriculture (ABARES 2022).

In the past 30 years, as global tariffs have declined, nations have become more and more likely to implement NTMs (figure 3.5). Globally, about 40% of NTMs come from export certification, inspection and licensing. The economic cost associated with non-tariff measures has been estimated as being more than double that of tariffs (UNESCAP 2019).

Australia imposes a relatively high number of technical barriers to trade compared with others in the Asia-Pacific region (behind China, New Zealand, and South Korea), with the majority of NTMs imposed by Australia being technical barriers to trade. Generally, it is not uncommon for more developed economies to have more non-tariff measures, given their more developed legislative and regulatory frameworks (UNESCAP 2019). At the same time, Australia has been ranked the highest performer globally in its implementation of trade facilitating measures (alongside New Zealand), which partly offset the non-tariff measures (including transparent processes and paperless trade) (UNESCAP 2022, p. 10).

Figure 3.5 – Global tariff and non-tariff measures in agriculture^a



a. Technical barriers to trade (TBTs) relate to technical regulations, standards and conformity assessment procedures. Sanitary and phytosanitary (SPS) measures relate to human, animal and plant health.

Source: ABARES (2022).

NTM costs can stem from legitimate processes relating to quarantine and licensing and, as such, are not easily removed unilaterally or avoided through trade agreements. At the same time, some of the protectionist measures imposed in 2020 were in the form of suspensions due to mislabelling, quarantine issues, and customs delays.

With regard to non-tariff barriers implemented within Australia, the Australian Government launched a *Non-Tariff Barrier Action Plan* in 2018. The objectives of the plan were:

- to make it easier for business to report trade barriers
- to build the capability of frontline expertise to service Australian exporters
- to increase transparency of the government’s actions to address non-tariff barriers (DFAT 2019, pp. 42–43).

While trade agreements help Australian exporters access foreign markets, their effect is limited with regard to NTMs. If governments are to reduce the risk of undue non-tariff barriers, this will require management of policy and regulatory risks through international cooperation on individual standards and general promotion of the rules-based system of trade.

Anti-dumping and countervailing measures

While Australia has reduced its use of tariffs over time, it remains a prolific user of anti-dumping measures (including countervailing measures), with the number of products subject to such measures increasing over the past decade (figure 3.6). In 2021, there were 67 anti-dumping measures in force in Australia and 6 new investigations were initiated — well above the world median (20 in 2021) (PC 2022f).

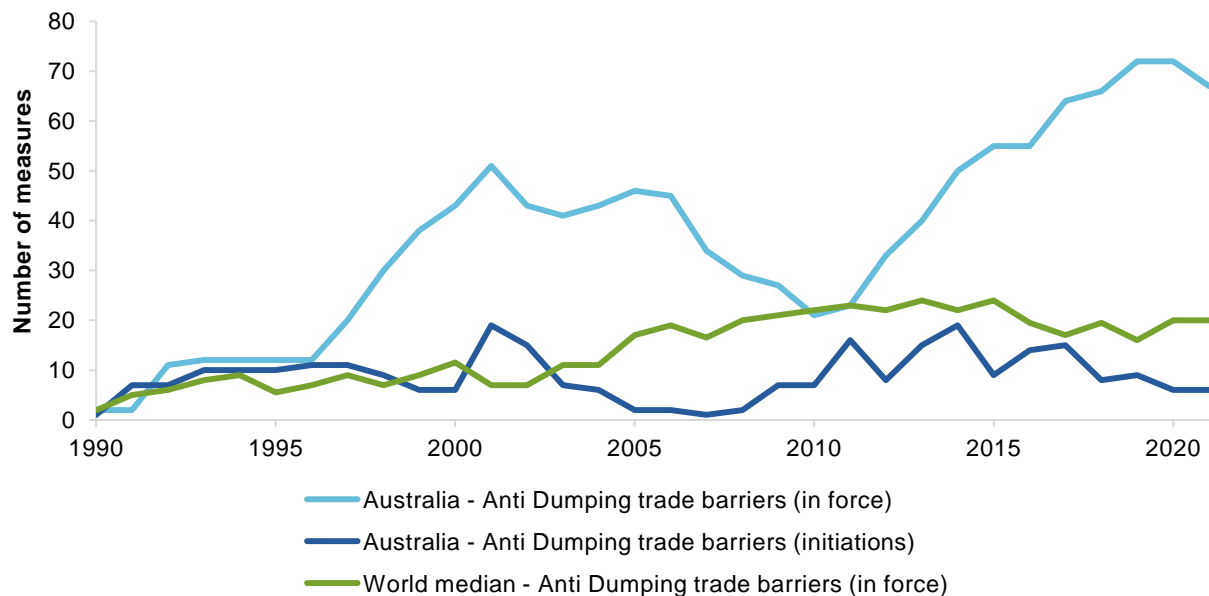
Anti-dumping measures in Australia are triggered by Australian firms applying to the Anti-Dumping Commission (ADC). The ADC can recommend the implementation of anti-dumping measures if:

... material injury has been caused by dumped or subsidised imports. Material injury to Australian industry can include:

- loss of sales, profits, market share and productivity
- negative impacts to prices, cash flow, inventories, and employment.

The injury must be greater than what normally occurs in the normal ebb and flow of business. (Anti-Dumping Commission 2022)

Figure 3.6 – Australia’s anti-dumping measures have grown over the past decade
Anti-dumping measures, 1990–2021



Source: PC (2022f).

As such, it is effectively a means for industry to seek to avoid import price competition where it can be deemed to result from the practice of ‘dumping’⁴⁰ — typically where low import prices are themselves the result of protection through domestic subsidies, or where imports are priced lower than in their country of

⁴⁰ ‘Dumping’ refers to a situation where the price of a product when sold in the importing country is less than the price of that product in the market of the exporting country, or below the cost of manufacture (Australian Government 2020; WTO 2022t).

origin. This is a stronger form of regulation than is afforded to price competition between domestic firms (under the *Competition and Consumer Act (2010)* (Cth)) which usually allows goods and services to be sold below the cost price unless other circumstances apply.⁴¹

Purported benefits of anti-dumping

On some level, as countervailing measures are used to counteract export subsidies, they may present a disincentive to governments to implement subsidies. However, as a relatively small consumer in most markets, Australia's measures are likely to have minimal impact on decisions about subsidies — indeed, there has been no evidence of such influence.

As such, the main effect of anti-dumping measures is to benefit relatively small number of domestic firms. However, this too can be muted where measures apply to only one of many source countries, or indeed only some producers within a country. A study of anti-dumping measures in the EU found that producers from third countries (not subject to the measures) gained significantly more market share than domestic producers (National Board of Trade 2014).

Arguments have also been put forward that it is important to retain an anti-dumping framework in order to retaliate against countries applying them on Australian exports. Assuming a tit-for-tat approach to trade protections, this suggests that Australia's use of anti-dumping could easily spur retaliation (indeed it has consistently been the basis of trade disputes with major trading partners (box 3.4)) even if a framework for such measures is retained.

Box 3.4 – Australia has faced several challenges to its measures

The WTO regulates how members respond to 'dumping' under the Anti-Dumping Agreement. Anti-dumping measures are permitted when governments demonstrate that:

- dumping is taking place
- difference between the price of the import in the country of origin and the price of the same product in the destination country
- dumping is causing harm to domestic businesses or risks doing so.

Australia has lodged multiple disputes with the WTO regarding anti-dumping actions taken by trading partners. However, Australia's own measures have also been disputed. For example:

- Australia began imposing anti-dumping measures on Indonesian importers of A4 copy paper in 2017 (among others). These measures were successfully challenged at the WTO's dispute settlement body in 2019. The ruling claimed the Anti-Dumping Commission had not made the required calculations in line with the appropriate methodology used to determine whether dumping had occurred.
- Australia is a respondent to one case that is currently before the WTO. In June 2021, China requested a consultation with Australia regarding Australian anti dumping and countervailing measures on certain products including wind towers, stainless steel sinks and railway wheels. A panel to hear the case was established in February 2022 and composed in September 2022.

Source: PC (2021f, 2022f), WTO (2019, 2022a).

⁴¹ Guidance published by the ACCC states that it is 'usually legal for businesses to sell products below the cost price', noting that it could be illegal if 'done in a way that substantially lessens competition' (ACCC 2022d).

Potential economy-wide gains from exiting

Overall, given the implications for resource allocation, there is likely to be an economy-wide net cost associated with any system of anti-dumping measures (PC 2016a). While the scale of the cost to Australia is unclear, it would be determined by the size and scope of such measures.⁴²

Yet, such costs persist. While WTO rules stipulate that anti-dumping measures are to be implemented for a set duration, the Anti-Dumping Commission has approved extensions in several instances. As such, anti-dumping measures represent an ongoing source of protection to relatively few firms and an ongoing economy-wide net cost. Moreover, there is no exit plan: the protections carries no expectation that firms will implement strategies to improve their competitiveness; nor has there been an indication from government that such measures are part of a broader plan to facilitate structural adjustment.

Rather than phase out its anti-dumping measures, Australia has strengthened its system in the past decade (box 3.5). While the reduction of compliance burdens are typically beneficial for any administrative system, making the anti-dumping system more user-friendly for industry encourages usage — and thereby, increases the net cost to the economy.

Box 3.5 – Australia’s anti-dumping measures were tightened in the past decade

While the Australian system has aspects that seek to limit the protection afforded by anti-dumping measures, changes in recent years have eroded these disciplines and made it easier for import-competing industries to access measures, at increased levels of protection. For example:

- the **lesser duty** rule is no longer applied in certain circumstances
- a broader set of factors are taken into account in determining whether industry has experienced **material injury**
- rules allow a **greater departure from market values** in estimating normal values
- the ADC introduced **zeroing** when calculating dumping margins over a period of time, which involves disregarding any sales where the export price is higher than the normal value (which results in higher average dumping margins)
- **anti-circumvention laws** were adopted.

Source: PC (2016a)

It should be noted that in order to receive anti-dumping protection, firms need not prove that they would be unprofitable in their absence — although this is generally assumed in arguments in favour of the system. To the extent that protection is being afforded to otherwise profitable firms, at the expense of others in the Australian economy, there would be a strong case to remove those protections immediately.

To the extent that protections are vital for the survival of domestic Australian producers, this raises two issues: first, that such policies are a negative influence on business dynamism, which is important for efficiency and productivity (as discussed in chapter 1); and second, that in transitioning away from protection, governments should consider the timing of reform and the potential need for complementary policies to facilitate structural adjustment.

⁴² The US International Trade Commission estimated that removing US anti-dumping and countervailing measures would have delivered a welfare gain equivalent to 0.03% of GDP.

In addition, new applications for anti-dumping protection should not be considered unless *economy-wide* costs and benefits are taken into account — as is the case in the European Union, Canada, Brazil, China, and New Zealand. While this could take the form of a formal public interest test (as recommended by PC (2010a)), it could also be implemented via the Minister’s current discretion over anti-dumping measures.⁴³

Accepting international standards

Australia is a signatory to the WTO Technical Barriers to Trade Agreement (TBT Agreement), which aims to prevent regulations, standards, testing and certification procedures from creating unnecessary obstacles to trade. The agreement ‘strongly encourages’ members to use international standards as the basis for their regulations and standards (DFAT nd). From a productivity perspective, the challenge for Australia is to balance the need for new and innovative imported products against consumer protections and public safety.

- The Australian Government regulates the first supply of certain goods through the use of standards and registers.
 - Therapeutic goods will generally need to be entered in the Australian Register of Therapeutic Goods before they can be legal imported. The Therapeutic Goods Administration notes that their regulatory approaches are aligned with international counterparts wherever possible.
 - Vehicle standards are regulated through Australian Design Rules, which cover aspects of vehicle safety, anti-theft, and emissions. Current Australian Government policy is to harmonise vehicle safety standards with international regulations where possible, with consideration given to the adoption of the international regulations of the United Nations.
- More broadly, standards set by the non-government national agency, Standards Australia, cover a wide range of products. Standards Australia provides input into international standards (as Australia’s representative to the ISO and other bodies) and has a policy of adopting international standards wherever possible. Approximately one-third of current Australian standards are ‘fully or substantially aligned’ with international standards, while one-third have no international equivalent (US Department of Commerce nd).

Despite the mutual benefit for countries that have aligned or agreed standards, this is not always easy to achieve in practice. For instance, in a recent Senate inquiry into trade between Australia and Pacific Island Countries, Standards Australia noted that poor harmonisation of standards was stifling trade in both directions (Joint Standing Committee on Foreign Affairs, Defence and Trade 2020). Generally, all countries bear costs when trade is impeded, but the costs can be particularly significant for countries who risk losing access to larger markets and more advanced technology — the latter will increasingly be relevant to productivity as technologies progress.

Australian industry stakeholders have raised issues where differences between Australian and international standards act as impediments to the use of less costly or more productive technologies. For example, the Commission’s (2020a) report into National Transport Regulatory Reform found that Australian Design Rules (ADRs) (among other regulations) had discouraged or delayed the use of new heavy vehicle technology that could potentially improve productivity and safety (such as twin steer prime movers).

In 2021, the Australian Government sought comment on three potential changes to ADRs, relating to monitoring devices to detect other road users; wider vehicles; and vehicles with more efficient axle configurations. They noted that if implemented, some of the immediate benefits relevant to productivity include:

⁴³ As outlined in the Australian Government response to the Productivity Commission’s (2010a) report, ‘the Minister currently has an unfettered discretion not to impose measures’ (Australian Government 2011, p. 26).

... less need for manufacturers to re-design or modify vehicles available in other markets ... Further, the changes proposed in relation to vehicle axle configuration would help manufacturers to supply vehicles that are more efficient and/or productive, including vehicles able to complete the same freight task in fewer trips, which reduces both transport costs and exposure related crash risks. (DITRDC 2021, p. 2)

With regard to the therapeutic goods, a review undertaken into medicines and medical devices regulation in 2016 resulted in several recommendations being implemented by the Therapeutic Goods Administration (TGA), in part to reduce the time delay before imported medications reach the Australian market. These include the new priority review pathway and provisional approval pathway, which are slated to shorten the processes by up to three months and two years respectively (Therapeutic Goods Administration 2020).

As previously recommended by the Commission, there would be value in accepting international standards that apply to goods, wherever practicable. While such standards would continue to play a crucial role in safeguarding public safety and consumer protections, it may be possible to make better use of international standards. In many cases, Australian consumers and businesses would generally be better served to the extent that standards adopted in other leading economies are ‘deemed to comply’ — a transparent review would still be possible in cases where the Australian Government identified a significant safety risk relating to an international standard.



Recommendation 3.8

More open trade and greater recognition of international standards

The Australian Government should promote open and resilient trade in goods including by:

- reducing Australia’s statutory import tariff levels to zero
- progressively removing Australia’s anti-dumping and countervailing measures, and subjecting any new measures to an economy-wide cost-benefit test.
- increasingly accepting product standards adopted in other leading economies as ‘deemed to comply’, provided that a transparent review could be undertaken in cases where the Australian Government identified a significant safety risk.

3.4 Avoiding undue constraints to foreign direct investment

Foreign investment has long been a feature of Australia’s capital markets. Broadly, as a net importer of debt-based financing, and a net exporter of equity-based financing, Australia has an interest in promoting the free flow of capital internationally.

Foreign *direct* investment (FDI) is more directly associated with innovation at the firm level. For instance, Breunig and Majeed analysed the BLADE panel dataset of Australian businesses and found foreign ownership to be an important source of ‘technological growth and innovation novelty’, particularly for larger firms (Majeed and Breunig 2021). Having foreign ownership was associated with a 1.2% increase in the probability of new-to-Australia innovations, and a 1.1% increase in the probability of new-to-world innovations.

Opportunities to facilitate FDI flows

Governments have a role in regulating various aspects of foreign investment and, in doing so, to ensure the regulatory burden of compliance does not unduly deter investment. The importance of regulatory burden was reflected in recent industry consultations for the Australia's Service Exports Action Plan, where one of the industry recommendations (noted by the Australian Government) was to develop:

... accessible, user-friendly tools that give greater clarity to foreign investors on how they will be taxed in Australia (such as detailed 'scenario-based' taxation guides based around the categories of financial products specified in the APEC Asia Region Funds Passport). (DFAT 2021a, p. 46)

In 2020, the OECD found that Australia's FDI screening framework had been more restrictive than in most advanced economies (figure 3.7). A new foreign investment screening process began operation on 1 January 2021, implementing a more stringent framework largely designed to manage greater national security challenges. The key aspects of the new framework include:

- call-in powers for the Treasurer, allowing the Treasurer to review a foreign investment action that has not been notified
- last resort powers for the Treasurer, allowing the Treasurer to review investment actions that had been previously approved by the FIRB
- enhanced monitoring and information gathering powers for authorised officers within Treasury
- new categories of investments to be subject to screening, as well as a register of foreign ownership of Australian assets
- a new fee structure for investment applications, involving higher fees across different categories of investment.

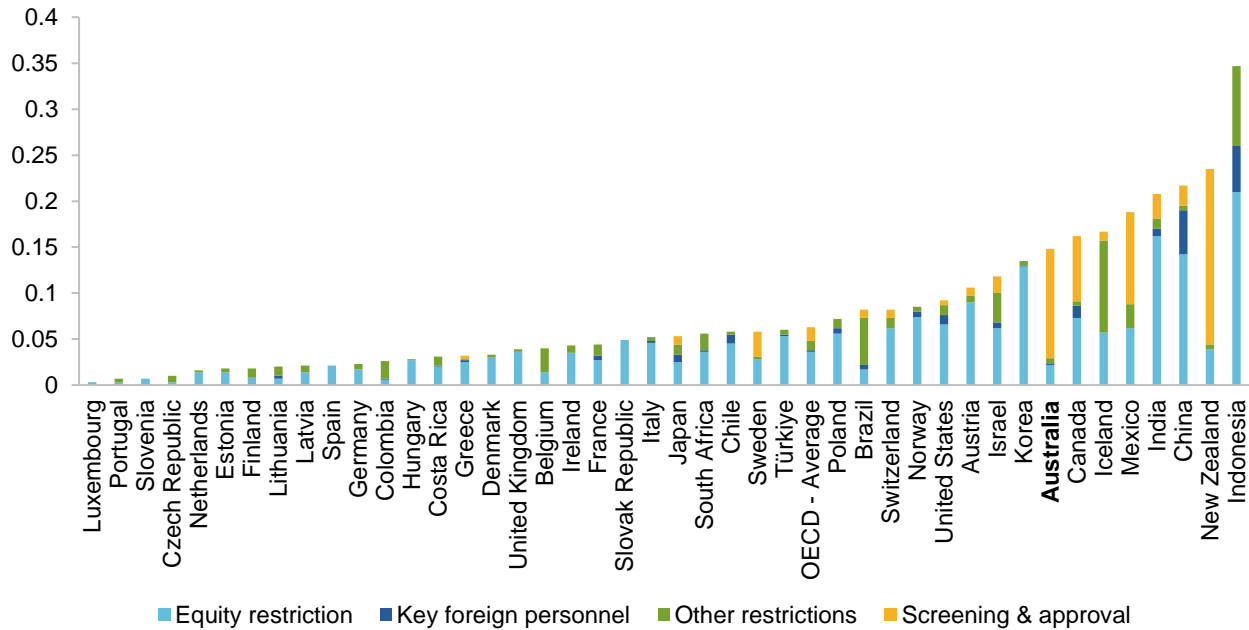
The new foreign investment screening framework could be expected to capture a larger proportion of FDI investments for review. As such, it is unclear to what extent an increase in FDI applications reflects an increase in overall investment activity, or simply an increase in the number of investments that now require screening. In addition, given that FDI levels in the past two years would have been heavily affected by the uncertainty caused by COVID-19 pandemic, it will be difficult to determine the impact of screening on investment for some time to come.

Indeed, the Foreign Investment Review Board (FIRB) reported an overall increase in the number of FDI proposals in 2020-21, although trends differed according to the size and industry of investment (figure 3.8). The decline in lower-value investments could be a reflection of changes to application fees, which are now proportionally higher for the lower scale of investments. Alternatively, it could also reflect dampening demand for residential property and other categories of investment.

Figure 3.7 – Australia’s FDI processes were already relatively restrictive in 2020
OECD FDI restrictiveness index

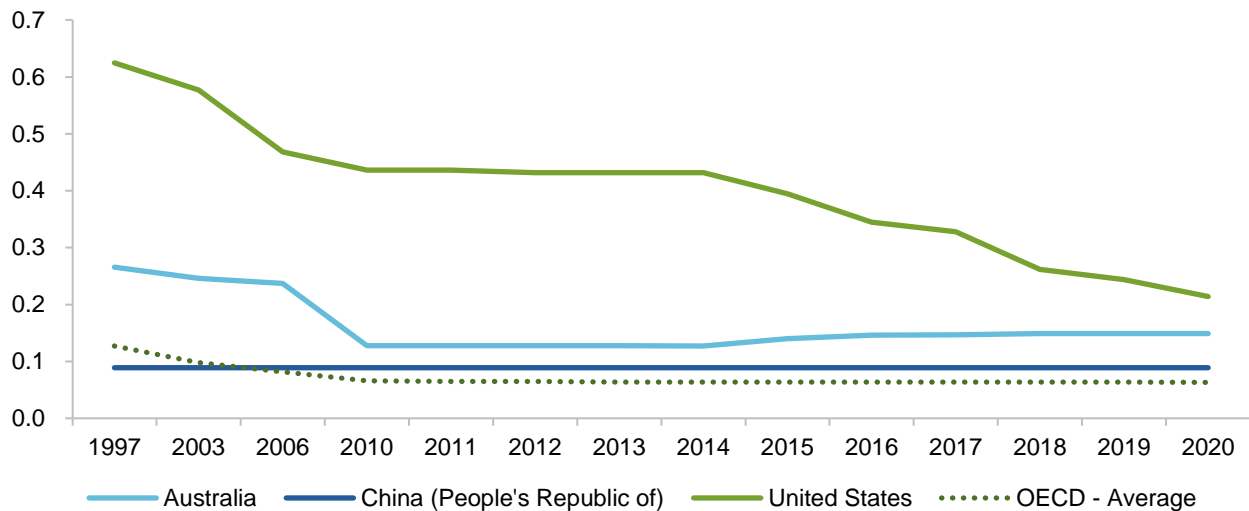
a. Screening is the most restrictive aspect of Australia’s FDI policy

Index 1 = Maximum restrictiveness



b. Australia’s FDI policy has long been more restrictive than the OECD average

Index 1 = Maximum restrictiveness

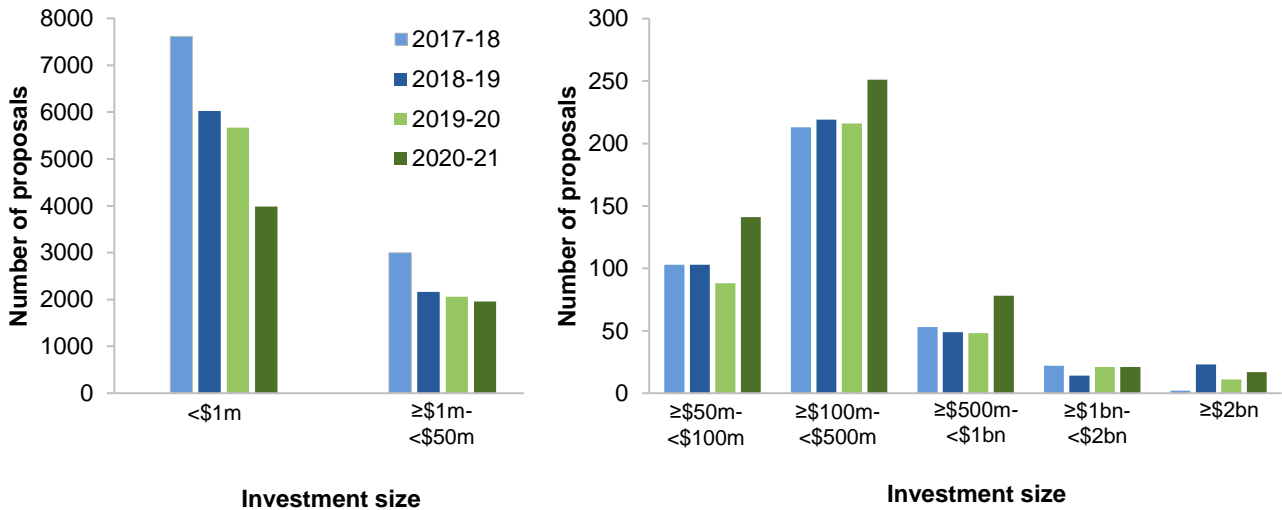


a. Australia implemented changes to its screening regime from 1 January 2022.

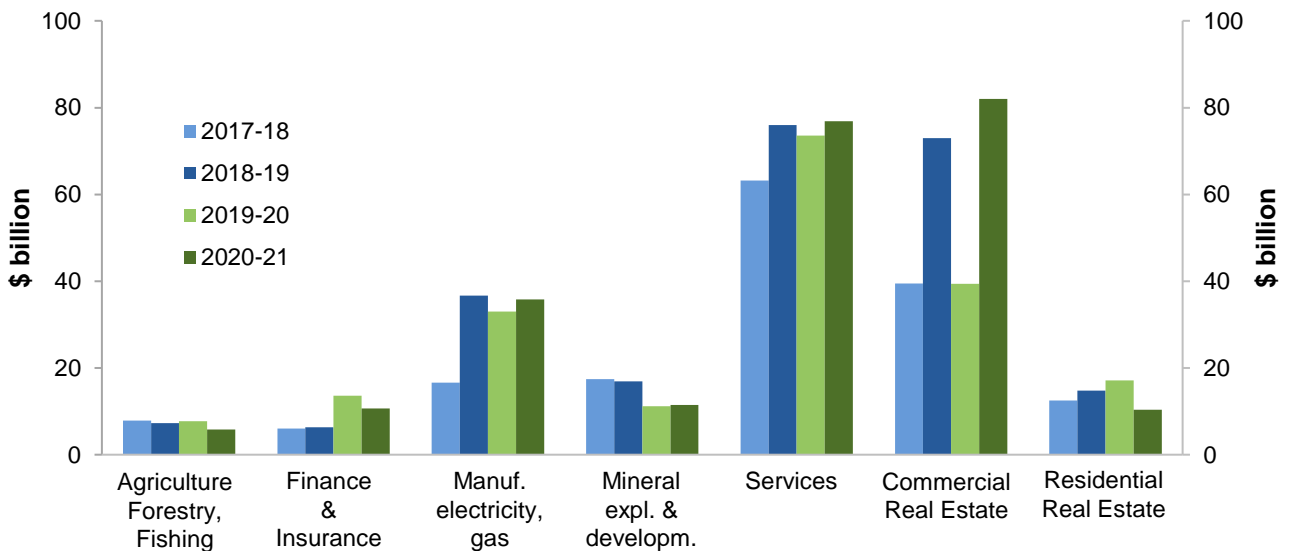
Source: OECD Foreign Direct Investment Regulatory Restrictiveness Index | Market openness Indicators.

Figure 3.8 – Trends in FDI applications vary by size and sector

a. Number of FDI applications by investment value



b. Value of FDI applications by sector



Source: FIRB (2021).

Potential chilling effects

What is certain is that the recent changes to the foreign investment screening process have increased the cost of making FDI in Australia. This could be expected to reduce investment at the margin and to alter its composition.

One critical factor of Australia’s screening framework is that it effectively places a tax on foreign investment (given that fees are in excess of cost recovery) at the stage of application (regardless of whether the investment is allowed to proceed). It is possible that over time, investors who have had previous applications rejected may reconsider their future investment intentions.

Moreover, despite fees that are already well in excess of cost recovery, they continue to be increased. Indeed, after being increased at 1 January 2021, they were doubled on 29 July 2022 (Chalmers 2022). The most recent increase in fees alone was estimated to raise an additional \$455 million over the forward estimates. Given the risk of affecting investment levels, the Australian Government should consider the efficiency of such a tax and its place in the tax system.

Consideration should also be given to the potential for distortions that may result from the differential treatment of FDI in different sectors. Specifically, FDI in agricultural land and businesses are subject to additional costs and regulations (box 3.6). Some (if not all) of these additional requirements and costs appear to be designed to make agricultural investments more difficult or costly in comparison to other commercial investments — rather than to rule them out altogether, as would be the case where strategic risks were significant. This approach stands in contrast to the National Farmers Federation’s calls for a several-fold increase in foreign investment in the sector within the next decade.⁴⁴

A further question relates to how the compliance costs of screening are treated alongside other ‘costs at the border’. Namely, that aspects of the screening regime have been treated as potential subjects of negotiation for preferential trade agreements.

Australia has sought to liberalise trade and investment through Free Trade Agreements (FTAs) and will honour its commitments under those agreements. The commitments include negotiated higher foreign investment screening thresholds for certain investors. All proposed investments will, however, continue to be screened consistently, regardless of the country of investor. (Treasury 2021, p. 4)

This raises questions as to how well the framework is geared to protect against potential fraud or national-security issues. As a result of trade negotiations, screening thresholds are more forgiving for countries with which Australia has implemented trade agreements.

FDI flows into Australia bring a range of important benefits for productivity. Screening frameworks thus should be designed to promote both national economic and security objectives. Undue compliance costs for investors may have the effect of chilling investment at the margin, for little gain. The use of application fees as a tax base poses such a risk, in part due to the size of the fee for lower and middle investment levels, and in part because it is rendered at the point of *application* rather than against profits.

Box 3.6 – Additional regulations apply to agricultural land

The additional regulations that apply to FDI in agricultural land do not appear to be linked to administrative or economic costs. Rather, they reflect a more cautious approach to foreign investment relative to other sectors.

For instance, application fees for foreign investment into agricultural land is significantly higher than for commercial land. FIRB (2022, p. 5) guidance on application fees show that:

- For agricultural land, application fees start at \$13 200 for investments of up to \$2 million, increasing in tiers for every additional \$2 million of investment, up to a maximum of fee \$1 045 000 for investments of more than \$80 million.

⁴⁴ The NFF note that FDI in the primary production stage of agriculture averaged \$260 million in the five years to 2018 — well short of their objective of \$12.5 billion of annual foreign investment between 2020 and 2030.

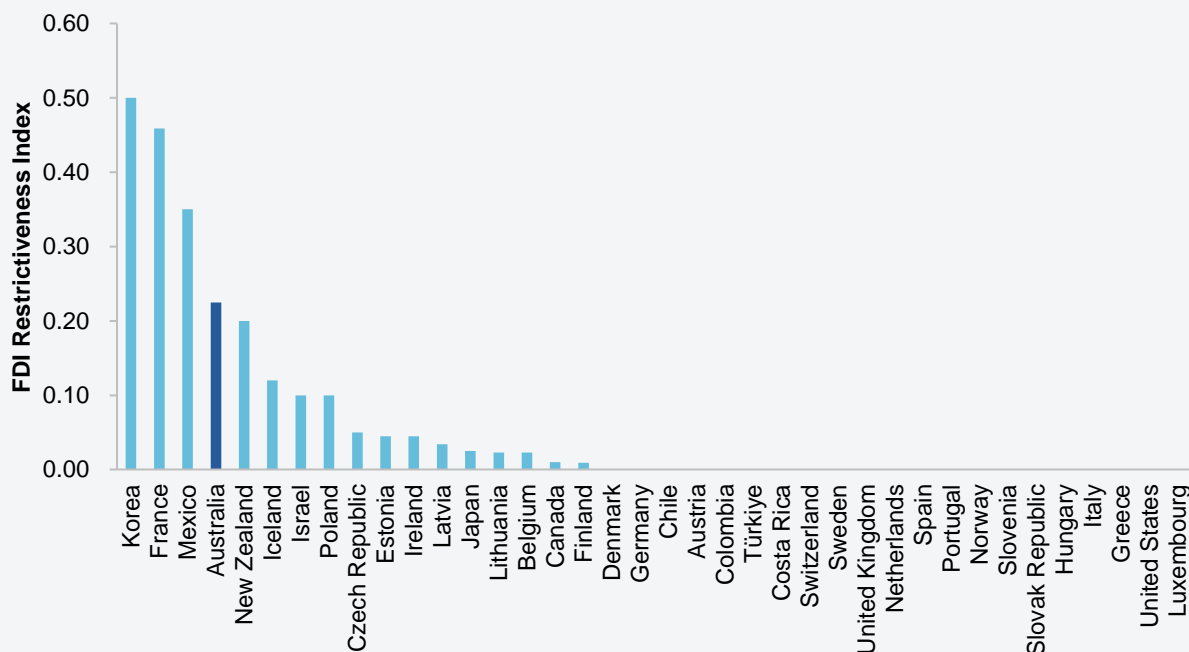
Box 3.6 – Additional regulations apply to agricultural land

- For commercial land, application fees start at \$13 200 for investments of \$50 million or less, increasing in tiers for every \$50 million of investment, rising to a maximum fee of \$1 045 000 for investments of more than \$2 billion.

Approved investors in Australian agricultural land are required to register with the ATO on its Agricultural Land Register, which was established to ‘provide greater transparency about the level of foreign ownership’ of agricultural land (ATO 2022). While this is not costly for investors, the premise for such a register is that community confidence must be maintained regarding FDI in agriculture, in such a way that does not apply to other commercial FDI. Similarly, in its recent review of the Register for Foreign Ownership of Water Entitlements, the Commission noted similarly that its purpose was mainly for providing transparency to help maintain community confidence (PC 2021d).

Compared with OECD countries, Australia is relatively restrictive with regard to FDI in agriculture (figure below), noting that the latest estimates for FDI restrictiveness predate the most recent changes to the FIRB screening framework. While New Zealand is rated as similarly restrictive, other advanced economies such as Canada, the United Kingdom, and the United States have much less restrictive regulations.

OECD FDI Restrictiveness Index for agriculture, 2020



Source: OECD (2022).



Recommendation 3.9

Addressing potential chilling effects of the Foreign Investment Review Framework

While the Australian Government should ensure its Foreign Investment Review Framework is fit for its purpose in addressing fraud and strategic risks, its design should be cognisant of the potential chilling effects on investment and subsequent costs to productivity. Application fees for proposed foreign direct investment (FDI) should not be used as a tax base.

More specifically, application fees for proposed FDI into agricultural land assets should be brought closer into line with other forms of investment, including by:

- applying indexation to the threshold investment value, as is done with most commercial investments
- adjusting the fee tiers so as to reduce the marginal rate fee as a proportion of the investment amount.

Migration and foreign investment

Over the past decade, the Australian Government has implemented specific visas for investors under the Business Innovation and Investment program. While migration policy could potentially be a barrier to investment at the margin (and indeed, similar visas have been implemented internationally) these visas are likely to have a negligible effect on the quantum of foreign investment.

For instance, Complying Investments from Significant Investor Visa holders between 2012 and 2020 amounted to \$11.745 billion (Department of Home Affairs 2021), but it is questionable as to what extent this represents new investment that would not have otherwise taken place. The Grattan Institute noted that:

... there is little evidence that Australia faces significant difficulties in attracting foreign investment for profitable activities. Australia is a medium-sized economy with a flexible exchange rate and relatively free capital mobility between Australia and the rest of the world. As such, Australia has little trouble attracting foreign investment. (Coates, Sherrell and Mackey 2021, p. 45)

Under the revised complying investment framework, people who hold Premium Investor Visas and Significant Investor Visas can still allocate much of their funds to listed equities and corporate and government bonds. The markets for these assets are highly liquid and deep, and attract significant offshore investment. As such, the Commission (2016b) has previously noted that, in the context of Australia's openness to foreign investment, it is doubtful whether Significant Investor Visa holders contribute any considerable amount of investment that is genuinely new to Australia.

Moreover, such investments are associated with the *visa approval process*, and there is no guarantee that granting permanent visas would result in ongoing investment from those migrants. Visa holders are typically required to hold investments for a prescribed duration in order to qualify for permanent residence. This means that, for any given area of investment targeted by the visa system, any new investment could be short-lived. In addition, it may provide poor incentives for efficient investment — anecdotal evidence suggests that some applicants consider their investments as simply a means of qualifying permanent residence, and may be less concerned about choosing investments on the basis of expected returns (Coates, Sherrell and Mackey 2021, pp. 46–47).

As noted previously by the Commission, the absolute quantum of additional investment associated with investor visas could still be material considerable *if* the number of visas were large. However, increasing the allocation of permanent visas to these streams would crowd out other forms of permanent migration, including skilled migration. As such, the use of such visas should be considered in the context of other potential impacts — particularly regarding any skills visa holders bring, and the overall fiscal implications of the program (discussed further in chapter 2 of volume 7).

3.5 Facilitating trade in services

As noted above, some of the gains from trade and investment are directly observable in the short-term — increased competition and innovation can improve market efficiency. Trade competition can also change how resources are allocated across the economy. Indeed, trade liberalisation has contributed to the formation of Australia’s service-based and resource-exporting economy.

Trade in services will be increasingly important for Australia’s productivity growth for two reasons: the majority of Australia’s output (by value) lies in the services sector; and that global trade in services is likely to increase in scale (both in import and exports).

For governments, facilitating trade in services entails different complications than trade in goods. The former can take place remotely or within the consuming or producing country (box 3.7), giving rise to a range of potential roles for policy: one is to ensure open trade policy settings; another involves reform across the regulatory landscape in order to make trade in services more practical, and to make Australia a more attractive market for trade.

Box 3.7 – Types of trade in services

Mode 1: Cross border supply

This occurs when a service is supplied from one country to another, but only the service crosses the border (i.e. neither the supplier nor the consumer moves). Examples of cross border supply include: an Australian company contracting an Indian company to provide call centre services (service debit); an Australian company providing legal advice over the phone to a company overseas (service credit).

Mode 2: Consumption abroad

This mode of supply occurs when the consumer moves across a border to access services (i.e. the supplier does not move). Examples of consumption abroad include: an American tourist consuming travel services (accommodation, food and entertainment) while they are visiting Australia (service credit); an Australian who travels to the United Kingdom to complete a university degree (service debit).

Mode 3: Commercial presence

Commercial presence requires the service supplier to set up operations in another country to provide services there. In this mode only the supplier moves from their resident country, establishing an on-the-ground presence in the consumers’ market as a foreign affiliate. Examples of commercial presence include: an Australian university establishing a campus in Asia (service credit); a Chinese hotel chain opening a resort within Australia (service debit). (Mode three is not included in ABS international trade in services statistics.)

Mode 4: Presence of natural persons

In mode four the services supplier moves temporarily from one country to another to deliver services. Examples of presence of natural persons include: an employee of an Australian software company flying to Fiji to deliver training (service credit); an architect from an UK-based firm working in New South Wales to provide consulting services for a new development in Sydney (service debit).

Source: ABS (2021).

How restrictive are current policy settings?

The OECD found that the global regulatory environment became more restrictive in 2020 across all services sectors covered by the Services Trade Restrictiveness Index (STRI), despite governments lowering barriers to digital trade in 2020.⁴⁵ While Australia has not been immune to this trend, Australia's regulatory landscape is less restrictive on trade in services than most comparable countries (box 3.8).

To this end, there has been mixed progress in terms of multilateral agreements on services trade. There has been little to no progress in establishing a Trade in Services Agreement (TiSA) and no new rounds of negotiations have taken place since 2016 (DFAT nd).⁴⁶ However, some progress has been made on digital services trade, mainly by including e-commerce provisions in 14 of Australia's trade agreements, as well as the Digital Economy agreement with Singapore.

Box 3.8 – The OECD Services Trade Restrictiveness Index

The OECD STRI collects information on services trade restrictions across 19 major services sectors. The project has two distinct but complementary instruments: a services trade regulatory database and a services trade restrictiveness index. These instruments provide a rich source of information for trade policy makers, trade negotiators and researchers, and an instrument for impact assessment of trade liberalisation. The STRI further allows individual countries to benchmark their services market regulations against the global best practice, identify outlier restrictions and current bottlenecks.

The regulatory database contains laws and regulations collected from 45 countries: the 36 OECD Member economies, Russia and key partners (Brazil, China, India, Indonesia, Malaysia and South Africa), as well as countries having accession discussions with the OECD. Based on the qualitative information in the database, composite indices quantify the identified restrictions across five standard policy categories, with values between zero and one. Complete openness to trade and investment gives a score of zero, while being completely closed to foreign services providers yields a score of one. Some factors considered in the STRI include:

- foreign equity restrictions (e.g. limits on foreign equity share)
- statutory monopolies
- duration of stay for temporary services suppliers
- public procurement practices
- visa processing times
- time, cost, and number of procedures required to register a company
- requirements for nationality for a full licence; or requirements to redo their training.

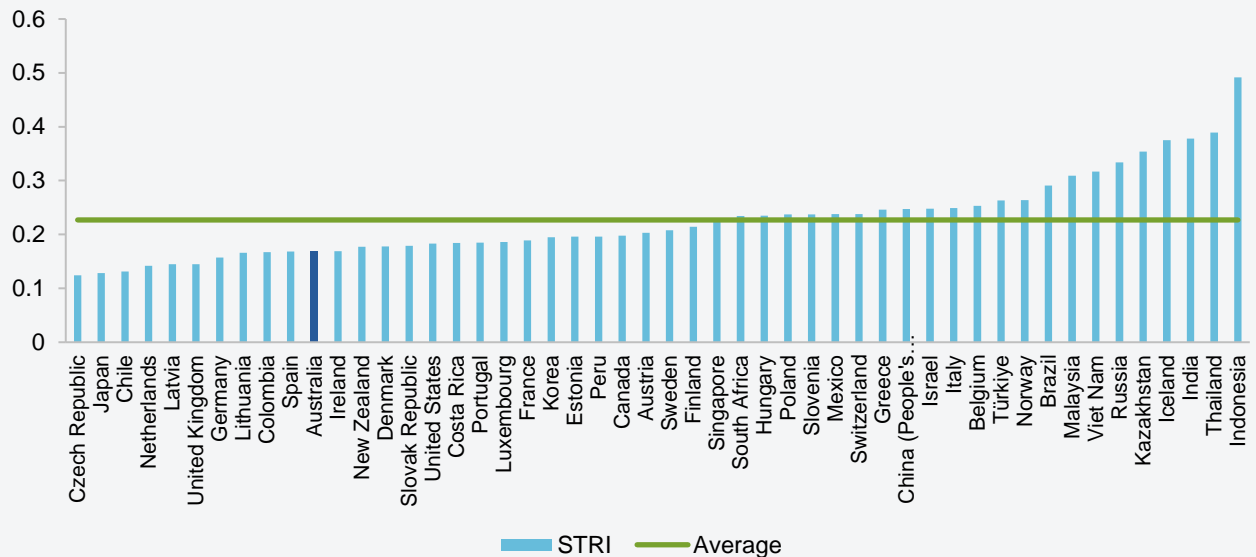
⁴⁵ The OECD's methodology for estimating regulatory restrictiveness to trade in services involves several simplifying assumptions and proxies. The qualitative assessment of each country is based largely on binary (yes/no) questions, with thresholds applied in some cases.

⁴⁶ Twenty-seven WTO members (including Australia, and representing 70% of global trade in services) initiated negotiations for the Trade in Services Agreement in March 2013 (DFAT nd; US Government nd). The Agreement was intended to reduce barriers to international trade in services (DFAT nd) and deal with modern trade concerns such as cross-border data flows (US Government nd).

Box 3.8 – The OECD Services Trade Restrictiveness Index

Australia is less restrictive than most comparable nations, 2021

Index 1 = Maximum restriction



Source: OECD (2023).

A range of policy levers facilitate trade in services

The Australian Government outlined their interest in boosting services exports beyond education and tourism in the 2017 Foreign Policy White Paper. The Australian Government subsequently outlined the Services Exports Action Plan (SEAP), which aims to promote open trade in services, including through ‘ease of movement of people, capital, services and data across borders’ (DFAT 2021a) (box 3.9). While in some cases, the Australian Government can only address these barriers by representing Australia’s interests in international fora (such as via the WTO and trade agreements), several aspects of the Australian regulatory environment are likely to contribute to the facilitation of service imports and the attractiveness of Australian service exports.

Box 3.9 – Australia’s Services Exports Action Plan

The Department of Foreign Affairs and Trade (DFAT) were given \$1.5 million to ‘develop an industry-led initiative to address barriers to Australia’s services exports and boost our services competitiveness’ (DFAT 2021a, p. 17). The plan identified five macro-level outcomes that reflect the interests of Australia’s services sector:

- free and open international trade in services
- best practice systems and rules across Australia
- world class skills and talent
- cutting edge and internationalised services in Australia
- information-driven policies and business strategies.

The action plan contains 72 recommendations, of which, the Australian Government has agreed to, agreed-in-principle or noted 64 and not agreed to 8.

What was not agreed in the Australian Government’s initial response?

- Commission an independent review of Australia’s skilled visa regime.
- Lift the restrictions on skilled migration to include people over the age of 50 to improve Australian services firms’ access to qualified personnel. (Age limits only apply to permanent migration).
- The Australian Prudential Regulation Authority (APRA) should review prudential, licensing and capital requirements for Australian financial services exporters, with a view to ensuring regulatory arrangements do not unfairly prejudice the ability of these firms to establish an offshore commercial presence.
- The Australian Government should expand the Australian Securities and Investment Commission (ASIC) mandate, requiring it to consider the effect of decisions on the international competitiveness of Australian financial services firms offshore.
- Ensure Australia has ready access to the best tech talent. In addition to recommendation 5A, one option could be to expand the New Colombo Plan to facilitate technology-focused learning exchanges with the United.
- With input from the financial services sector, DFAT should review the extent to which information from Treasury, ASIC and APRA is captured in the FTA Portal, with a view to providing more comprehensive and consolidated information for financial services exporters.
- The Government should extend grant limits and raise the revenue threshold of the Export Markets Development Grant (EMDG) scheme to support established firms entre new and challenging markets overseas.
- Establish a regulatory sandbox that allows health services firms to offer low-risk health services and digital tools to controlled markets, providing an early market test for safety, efficacy, economics and enabling pre-market surveillance for regulators.

Source: DFAT (2021a).

The OECD’s STRI provides a useful taxonomy of regulations that affect the relative openness of policy settings to services trade — many of which are discussed elsewhere in this report.

- Tax and compliance costs, including the costs associated with procedures required to register or unwind a company, are among several fundamental aspects of business regulation that have a direct influence on investment (chapter 2).

- Foreign equity restrictions apply in several countries, often involving caps on equity holdings for foreign nationals. As discussed above, the more prescient issues facing FDI inflows to Australia involve compliance and other costs at the border. Application fees in particular should be set with (tax) efficiency in mind.
- Occupational licensing is an important safeguard for quality of service in many occupations, particularly where information asymmetries can prevent consumers and clients from choosing appropriate suppliers, and particularly where health and safety risks are present. However, a misalignment of licensing regimes between Australia and other countries, or rigidities in licence recognition between jurisdictions, can prevent qualified suppliers from providing services within the Australian market (chapter 3 of volume 7).
- Temporary migration can make the delivery of services difficult in practice — not only in terms of policy settings, but their administration. Services supplied via a commercial presence may require temporary migration. Decisions are likely to be affected by the allowed duration of stay for particular visas, as well as the processing times, compliance costs, and uncertainty associated with visa applications (discussed in chapter 2 of volume 7).

With regard to migration, the skilled worker visa subclasses are likely to be of particular relevance trade in services. However, trade in services may also benefit from the migration of entrepreneurs. This would include highly skilled workers who operate their own businesses — fulfilling supply contracts for Australian clients as opposed to being employed by Australian businesses. The differences between these types of suppliers is merely contractual, and should not result in different arrangements in the migration system.

The Commission has previously pointed out significant issues with the design of Significant and Premium Investor Visas. They do not effectively target forms of investment that are otherwise lacking, and are subject to relatively lax requirements compared with other permanent migration visas (potentially leading to poorer migration outcomes or fraud). There are good arguments for abolishing these visas as they currently stand. However, there would be value in devising new visas to better target entrepreneurs involved trade in services.



Recommendation 3.10

Prepare for increased global trade in services

In order to ensure the Australian economy is well-placed to benefit from the global increase in trade in services, Australian governments should reduce barriers to trade in services both 'at the border' and 'behind the border'. This will require consideration of not only trade policy (recommendations 3.7 and 3.8), but also tax settings (recommendation 3.4), occupational licensing (recommendations 7.9 to 7.12), foreign direct investment (recommendation 3.9), improved recognition of overseas qualifications (recommendations 7.7 and 7.8) and temporary migration settings (recommendation 7.5).

Abbreviations

ABS	Australian Bureau of Statistics
ACC	Allowance for corporate capital
ACCC	Australian Competition and Consumer Commission
ACE	Allowance for corporate equity
AGCNCO	Australian Government Competitive Neutrality Complaints Office
ANZSCO	Australian and New Zealand Standard Classification of Occupations
ANZSIC	Australian and New Zealand Standard Industrial Classification
APRA	Australian Prudential Regulation Authority
ASIC	Australian Securities and Investment Commission
ATO	Australian Taxation Office
BLADE	Business Longitudinal Analysis Data Environment
CBA	Cost-benefit analysis
CBIT	Comprehensive business income tax
COVID-19	Coronavirus disease (an infectious disease caused by the SARS-CoV-2 virus)
ERA	Effective rate of assistance
EU	European Union
EV	Electric vehicle
FDI	Foreign direct investment
FTA	Free trade agreement (also referred to as a preferential trade agreement)
GBE	government business enterprise
GDP	Gross Domestic Product
HHI	Herfindahl-Hirschman Index
IT	Information Technology
ICT	Information and Communication Technology
IPART	Independent Pricing and Regulatory Tribunal
MPAA	Major Projects Facilitation Agency
MPF	Major Project Facilitation
MPFA	Major Projects Approval Agency
NBN	National Broadband Network
NDIA	National Disability Insurance Agency
NDIS	National Disability Insurance Scheme

OECD	Organisation for Economic Co-operation and Development
PC	Productivity Commission
PTA	Preferential trade agreement
RBA	Reserve Bank of Australia
SME	Small and medium enterprise
STRI	OECD Services Trade Restrictiveness Index
TSS	Temporary Skill Shortage
UK	United Kingdom
UN	United Nations
US	United States
ZLEV	Zero and low emission vehicles

References

- ABARES (Australian Bureau of Agricultural and Resource Sciences) 2022, *Analysis of Australia's future agricultural trade advantage*.
- ABS (Australian Bureau of Statistics) 2021, *Modes of supply: International Trade in Services; Concepts, Sources and Methods*.
- 2022a, *Effects of COVID-19 strains on the Australian economy*.
- 2022b, *Private New Capital Expenditure and Expected Expenditure, Australia*, June, Cat. no. 5625.0.
- ACCC (Australian Competition and Consumer Commission) 2014, *Determination Application for authorisation lodged by Transport Workers' Union of Australia Queensland Branch on behalf of owner drivers in respect of collective bargaining with Toll Transport Pty Ltd for services at the Toll Priority Brisbane Branch*, 16 October, A91427, Canberra.
- 2020, *Northern Australia Insurance Inquiry*.
- 2022a, *Digital platform services inquiry: Interim report No. 5—Regulatory reform*.
- 2022b, *Discussion paper for Interim Report No. 5: Updating competition and consumer law for digital platform services*, Digital platform services inquiry.
- 2022c, *Ex post review of ACCC merger decisions*.
- 2022d, *Setting prices: what's allowed*, <https://www.accc.gov.au/business/pricing/setting-prices-whats-allowed#:~:text=Predatory%20pricing,market%20power%20and%20is%20illegal>. (accessed 5 January 2023).
- 2022e, *War in Ukraine and OPEC production limits pushed February petrol prices to eight-year high*, <https://www.accc.gov.au/media-release/war-in-ukraine-and-opec-production-limits-pushed-february-petrol-prices-to-eight-year-high> (accessed 23 July 2022).
- ACMA 2022, *How we use the internet*, Communications and media in Australia, <https://www.acma.gov.au/publications/2022-12/report/communications-and-media-australia-how-we-use-internet> (accessed 26 January 2023).
- AEMO 2022, *AEMO releases 30-year electricity market roadmap*, <https://aemo.com.au/newsroom/media-release/aemo-releases-30-year-electricity-market-roadmap> (accessed 24 August 2022).
- Aghion, P., Akcigit, U. and Howitt, P. 2013, *What Do We Learn From Schumpeterian Growth Theory?*, Working Paper 18824, February, National Bureau of Economic Research.
- Allen, M. 2020, 'How craft spirit makers are avoiding sacking staff', *Australian Financial Review*, <https://www.afr.com/life-and-luxury/food-and-wine/how-craft-spirit-makers-are-avoiding-sacking-staff-20200402-p54ggn> (accessed 14 September 2022).
- AMA (Australian Medical Association) 2021, *The future of dispensing: Ensuring Australians have affordable and accessible medicines into the future*.
- Andrews, D. and Hansell, D. 2019, *Productivity-enhancing labour reallocation in Australia*.
- Anti-Dumping Commission 2022, *What we do*, <https://www.industry.gov.au/anti-dumping-commission> (accessed 5 January 2023).
- ASIC (Australian Securities and Investments Commission) 2017, *Review of mortgage broker remuneration*.
- 2020, *Enhanced regulatory sandbox*, <https://asic.gov.au/for-business/innovation-hub/enhanced-regulatory-sandbox/> (accessed 14 August 2022).
- ATO (Australian Taxation Office) 2022, *Register of foreign ownership of agricultural land: Report of registrations as at 30 June 2021*.
- Australia Post 2022, *2022 Inside Australian Online Shopping: eCommerce Industry Report*.
- Australian Government 2011, *Streamlining Australia's anti-dumping system: An effective anti-dumping and countervailing system for Australia*.
- 2022, *National Electric Vehicle Strategy: Consultation Paper*, Department of Climate Change, Energy, the Environment and Water.
- Bakhtiari, S. 2019, *Trends in the market concentration of Australian industries*, Research Paper 8/2019, September, Department of Industry, Innovation and Science.
- 2020, *Market Power and Entrepreneurship Change: the Case for Australia*, Research Paper 2/2020, Department of Industry, Science, Energy and Resources, Commonwealth of Australia.
- Bank, J. and Lewis, M. 2021, 'Australia's economic recovery and access to small business finance', *Reserve Bank of Australia Bulletin*, March, pp. 43–49.
- Banks, G. 2008, *Industry Policy for A Productive Australia*, Productivity Commission Chairman's Speech, Canberra.
- Baumol, W.J. 1982, 'Contestable markets: An uprising in the theory of industry structure', *American Economic Review*, vol. 72, no. 1, pp. 1–15.
- BITRE 2021, *Road-related revenue and expenditure dashboard*, <https://app.powerbi.com/view?r=eyJlJoiODM1ZTYzN2ItODViZi00NGRkLTk5ZWUeNGNkZTM1MzMzMWVjIiwidCI6ImFhMjFiNjQwLWJhYzltNDU2ZC04NTA1LWYyY2MwN2Y1MTC4NCJ9> (accessed 26 January 2023).
- 2008, *How do fuel use and emissions respond to price changes?*, BITRE Briefing 1, Australian Government Department of Infrastructure, Transport, Regional Development and Local Government.
- 2022, *Australian Infrastructure and Transport Statistics: Year Book 2022*, December, Australian Government.
- Bloom, A.H.N. and Furceri, D. 2018, *World Uncertainty Index*, Standord mimeo.
- Bond, S., Hashemi, A., Kaplan, G. and Zoch, P. 2021, 'Some unpleasant markup arithmetic: Production function elasticities and their estimation from production data', *Journal of Monetary Economics*, vol. 121, pp. 1–14.
- Breunig, R.V. and Gisz, C. 2009, 'An Exploration of Australian Petrol Demand: Unobservable Habits, Irreversibility and Some Updated Estimates*', *Economic Record*, vol. 85, no. 268, pp. 73–91.
- Brons, M., Nijkamp, P., Pels, E. and Rietveld, P. 2008, 'A meta-analysis of the price elasticity of gasoline demand. A SUR approach', *Energy Economics*, vol. 30, no. 5, pp. 2105–2122.

- Burke, T. 2022, *Hansard: House of Representatives* 22/11/2022, https://www.aph.gov.au/Parliamentary_Business/Hansard/Hansard_Display?bid=chamber/hansardr/25520/&sid=0005 (accessed 13 December 2022).
- Cairó, I. 2013, *The slowdown in business employment dynamics: the role of changing skill demands*.
- Cao, H., King, S. and Samuel, G. 2022, 'Contested mergers and the ACCC's proposed merger reforms', *Australian Business Law Review*, vol. 50, no. 1, pp. 34–62.
- Chalmers, J. 2022, *Increase to foreign investment fees and penalties*, Joint Media release.
- Chemist Warehouse 2016, *Submission to the Review of Pharmacy Remuneration and Regulation*.
- Coates, B., Sherrell, H. and Mackey, W. 2021, *Rethinking permanent skilled migration after the pandemic*, Grattan Institute.
- Croci, E. 2016, 'Urban Road Pricing: A Comparative Study on the Experiences of London, Stockholm and Milan', *Transportation Research Procedia*, vol. 14, pp. 253–262.
- DAE (Deloitte Access Economics) 2022, *All systems go: Transforming Australia's economy to grow*.
- David, R. 2019, *Budget Submission 2020-21*, Private Healthcare Australia.
- Davidoff, I. and Leigh, A. 2013, 'How Do Stamp Duties Affect the Housing Market?', *Economic Record*, vol. 89, no. 286, pp. 396–410.
- Debelle, G. 2017, 'Business investment in Australia', presented at UBS Australasia Conference 2017, Reserve Bank of Australia.
- Department of Home Affairs 2021, *Significant Investor visa statistics*, <https://www.homeaffairs.gov.au/research-and-statistics/statistics/visa-statistics/work/significant-investor-visa> (accessed 6 January 2023).
- DFAT (Australian Department of Foreign Affairs and Trade) nd, *Trade in Services Agreement (TISA)*, <https://www.dfat.gov.au/trade/agreements/negotiations/tisa/trade-in-services-agreement#:~:text=The%20Trade%20in%20Services%20Agreement,cent%20of%20global%20services%20trade>. (accessed 23 March 2022).
- 2018, *Addressing non-tariff trade barriers*, <https://www.dfat.gov.au/trade/exporters-and-importers/addressing-non-tariff-trade-barriers> (accessed 11 May 2022).
- 2019, 'Taking action on trade barriers', *Across Borders*, Spring, pp. 42–43.
- 2021a, *Australia's services exports action plan*, April, Canberra.
- 2021b, *Statistics on who invests in Australia*, <https://www.dfat.gov.au/trade/resources/investment-statistics/statistics-on-who-invests-in-australia> (accessed 8 September 2022).
- 2021c, *Trade and Investment at a glance 2021*, <https://www.dfat.gov.au/publications/trade-and-investment/trade-and-investment-glance-2021#two-way-trade> (accessed 24 July 2022).
- 2022a, *Australia's free trade agreements (FTAs)*, <https://www.dfat.gov.au/trade/agreements/trade-agreements> (accessed 23 July 2022).
- 2022b, *Simplifying Australia's trade system*, <https://www.dfat.gov.au/about-us/publications/trade-investment/business-envoy/business-envoy-february-2022/simplifying-australias-trade-system> (accessed 24 August 2022).
- nd, *Technical Barriers to Trade (TBT)*, <https://www.dfat.gov.au/trade/organisations/wto/Pages/technical-barriers-to-trade-tbt#:~:text=The%20WTO%20Agreement%20on%20Technical,create%20unnecessary%20obstacles%20to%20trade>. (accessed 28 January 2023).
- DITRDC (Department of Infrastructure, Transport, Regional Development and Communications) 2020, *National Heavy Vehicle Charging Pilot: Small Scale On-Road Trial Evaluation Report*, February, Australian Government.
- 2021, *Safer freight vehicles*.
- 2022, *Why on-road Trials?*, Department of Infrastructure, Transport, Regional Development, Communications and the Arts, Department of Infrastructure, Transport, Regional Development, Communications and the Arts, <https://www.infrastructure.gov.au/infrastructure-transport-vehicles/transport-strategy-policy/heavy-vehicle-road-reform/national-heavy-vehicle-charging-pilot/why-road-trials> (accessed 31 January 2023).
- Duckett, S. and Moran, G. 2021, *Stopping the death spiral: Creating a future for private health*, Grattan Institute.
- Dynan, L. 2021, 'Which firms drive business investment? New evidence on the firm-size distribution', *Reserve Bank of Australia Bulletin*, December, pp. 1–11.
- Edwards, H. and Lane, K. 2021, 'Why are investment hurdle rates so sticky?', *Reserve Bank of Australia Bulletin*, December, pp. 12–20.
- Emmery, M. 1999, *Industry Policy in Australia*, Research Paper 3 1999-2000, 21 September, Parliamentary Library.
- Fels, A. and Cousins, D. 2019, *Submission to the ACCC Northern Australia Insurance Inquiry*.
- FIRB (Foreign Investment Review Board) 2021, *Annual Report 2020-21*, pp. 1–64.
- 2022, *Fees on Foreign Investment Applications: Guidance 10*, 1 July 2022,.
- Galindo, L.M., Samaniego, J., Alatorre, J.E., Carbonell, J.F. and Reyes, O. 2015, 'Meta-analysis of the income and price elasticities of gasoline demand: public policy implications for Latin America', United Nations, *CEPAL Review*, vol. 2015, no. 117, pp. 7–24.
- Gibson, M. and Carnovale, M. 2015, 'The effects of road pricing on driver behavior and air pollution', *Journal of Urban Economics*, vol. 89, pp. 62–73.
- Goetz, S.J., Fleming-Muñoz, D.A. and Han, Y. 2016, 'What makes one economy more resilient than another?', *The Conversation*, <https://theconversation.com/what-makes-one-economy-more-resilient-than-another-54374> (accessed 21 July 2022).
- Gutiérrez, G. and Philippon, T. 2016, *Investment-less growth: An empirical investigation*.
- Hambur, J. 2021, *Product Market Power and its Implications for the Australian Economy*, Treasury Working Paper, 2021–03.
- and Jenner, K. 2019, *Can structural change account for the low level of non-mining investment?*, Reserve Bank of Australia.
- Harper, I., Anderson, P., McCluskey, S. and O'Bryan, M. 2015, *Competition Policy Review*, March, Australian Government.
- Harrison, M. 2010, *Valuing the Future: the Social Discount Rate in Cost-Benefit Analysis*, Visiting Researcher Paper, April, Productivity Commission, Canberra.
- Home Affairs (Department of Home Affairs) 2022, *Temporary resident (skilled) report*, June.

- Infrastructure Australia 2021, *A national study of infrastructure risk: A report from Infrastructure Australia's Market Capacity Program*.
- Infrastructure Victoria 2020, *Fair Move: Better Public Transport Fares for Melbourne*, Melbourne.
- Jagot, J. 2021, 'Some thoughts about proof in competition cases', presented at the *18th Annual Competition Law and Economics Workshop*.
- Jenner, K. and Tulip, P. 2020, *The Apartment Shortage*, Research Discussion Paper, RDP 2020–04, Reserve Bank of Australia.
- Jericho, G. 2022, 'Large firms are consolidating power like Scott Morrison consolidates jobs – and it's hurting productivity', *The Guardian*, 24 August, <https://www.theguardian.com/business/grogonomics/2022/aug/24/large-firms-are-consolidating-power-like-scott-morrison-consolidates-jobs-and-its-hurting-productivity> (accessed 26 August 2022).
- Joint Standing Committee on Foreign Affairs, Defence and Trade 2020, *Barriers and impediments to trade and investment between Australia and the Pacific*.
- Jordà, Ò., Knoll, K., Kuvshinov, D., Schularick, M. and Taylor, A.M. 2017, *The rate of return on everything, 1870–2015*, Working Paper 2017–25, Federal Reserve Bank of San Francisco.
- Kendall, R. and Tulip, P. 2018, *The Effect of Zoning on Housing Prices*, Research Discussion Paper – RDP 2018–03, Reserve Bank of Australia.
- King, S. 2021, *The Australian Competition and Consumer Commission's proposed merger reforms*, Background material for panel discussion at the 18th annual UniSA/ACCC Competition Law and Economics Workshop, 15 October 2021.
- , Watson, J. and Scott, B. 2017, *Review of pharmacy remuneration and regulation*.
- KordaMentha Restructuring 2018, *Pharmacy: An industry at a crossroads*.
- Lane, K. and Rosewall, T. 2015, 'Firms investment decisions and interest rates', *Reserve Bank of Australia Bulletin*, June, pp. 1–8.
- Lin, C. and Chu, M.M. 2022, 'Singapore's national dish at risk as Malaysia stops chicken exports', *Australian Financial Review*.
- Litman, T. 2011, *Distance-Based Vehicle Insurance Feasibility, Costs and Benefits*, 8 June, Victoria Transport Policy Institute, Melbourne.
- Majeed, O. and Breunig, R.V. 2021, *Determinants of innovation novelty: Evidence from Australian administrative data*, TTPI-Working Paper 15/2021.
- Marin-Guzman, D. 2022, 'Air-con chiefs, unions embrace new laws to stop being undercut on pay', *Australian Financial Review*, 28 November, <https://www.afr.com/work-and-careers/workplace/manufacturers-move-on-sector-deal-amid-race-to-bolster-union-hurdles-20221128-p5c1u0> (accessed 1 February 2023).
- McCredie, B., Bergman, N. and Smith, D. nd, *Government announces major reforms to EPBC Act*, Allens, <https://www.allens.com.au/insights-news/insights/2022-12/government-announces-major-reforms-to-epbc-act/#anchor3> (accessed 23 January 2023).
- McKinsey Global Institute 2022, *Global flows: The ties that bind in an interconnected world*, <https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/global-flows-the-ties-that-bind-in-an-interconnected-world> (accessed 3 January 2023).
- Minifie, J. 2017, *Stagnation nation? Australian investment in a low-growth world*, Grattan Institute.
- , Chisholm, C. and Percival, L. 2017, *Competition in Australia: Too little of a good thing?*, Grattan Institute.
- Mitchell, D. and Monterosso 2021, *Modelling small-area electric vehicle uptake across Australia*, Australasian Transport Research Forum 2021 Proceedings, 8–10 December, Brisbane.
- Murphy, C. 2018, *Australia's high company tax rate and dividend imputation: a poor recipe for a small open economy?*, Tax and Transfer Policy Institute.
- National Board of Trade 2014, *Do EU Producers and the EU Economy Really Benefit from Anti-Dumping Policy?*, Government of Sweden.
- Neely, M.C. 1993, *The Pitfalls of Industrial Policy*, April, Regional Economist, Federal Reserve Bank of St. Louis.
- New Zealand Foreign Affairs and Trade 2022, *The Biden-Harris Administration's Actions to Secure Supply Chains*, <https://www.mfat.govt.nz/en/trade/mfat-market-reports/market-reports-americas/report-on-the-biden-harris-administrations-actions-to-secure-supply-chains/> (accessed 23 July 2022).
- Nguyen, L. 2021, 'Australian Private Health Insurance: Industry Performance, Market Failure and Government Policy', PhD Doctorate thesis, Griffith University.
- NTC (National Transport Commission) 2016, *Regulatory reforms for automated road vehicles*, November, National Transport Commission, Melbourne.
- 2022, *Options for setting heavy vehicle charges for 2023–24 and beyond*, September, Australian Government.
- OECD 2023, *OECD.Stat*, <https://stats.oecd.org/Index.aspx?DataSetCode=STRI> (accessed 28 January 2023).
- 2022, *OECD FDI Regulatory Restrictiveness Index*, <https://stats.oecd.org/Index.aspx?datasetcode=FDIINDEX> (accessed 22 August 2022).
- Parham, D. 2004, 'Sources of Australia's Productivity Revival', *Economic Record*, vol. 80, no. 249, pp. 239–257.
- PC (Australian Government Competitive Neutrality Complaints Office) 2022a, *NBN Co*, Investigation No. 18, Canberra.
- PCNSW (NSW Productivity Commission) 2020, *NSW Productivity Commission Green Paper: Continuing the productivity conversation*.
- PC (Productivity Commission) 1999, *Microeconomic Reforms and Australian Productivity: Exploring the Links*, Commission Research Paper, Canberra.
- 2001, *Submission to DFAT on Australia's Approach to Forthcoming Trade Negotiations*, Canberra.
- 2009, *Review of Regulatory Burden on the Upstream Petroleum (Oil and Gas) Sector*, Research Report, Canberra.
- 2010a, *Australia's Anti-dumping and Countervailing System*, Report no. 48, Canberra.
- 2010b, *Bilateral and Regional Trade Agreements*, Research Report, Canberra.
- 2013, *Mineral and Energy Resource Exploration*, Report no. 65, Canberra.
- 2014, *Public Infrastructure*, Report no. 71, Canberra.
- 2015, *Efficiency in Health*, Commission Research Paper, Canberra.
- 2016a, *Developments in Anti-Dumping Arrangements*, Commission Research Paper, Canberra.

- 2016b, *Migrant Intake into Australia*, Report no. 77, Canberra.
- 2017a, *Funding and Investment for Better Roads*, Shifting the Dial: 5 year Productivity Review, Supporting Paper no. 9.
- 2017b, *Introducing Competition and Informed User Choice into Human Services: Reforms to Human Services*, Report no. 85, Canberra.
- 2017c, *Shifting the Dial: 5 year productivity review*, Report no. 84.
- 2017d, *Shifting the Dial: 5 Year Productivity Review*, Report no. 84, Canberra.
- 2018, *Competition in the Australian Financial System*, Report no. 89, Canberra.
- 2020a, *National Transport Regulatory Reform*, Report no. 94, Canberra.
- 2020b, *PC Productivity Insights: Recent Productivity Trends*, Canberra, February.
- 2020c, *Submission to the Joint Standing Committee on Treaties Inquiry into Certain Aspects of the Treaty-Making Process in Australia*, Canberra.
- 2020d, *Victoria's Commercial Land Use Zoning*, Productivity Reform Case Study, Canberra.
- 2020e, *Resources Sector Regulation*, Study Report, Canberra.
- 2021a, *Implementing innovation across the health system*, Information Paper, May.
- 2021b, *Plan to identify planning and zoning reforms*, Information Paper, Canberra.
- 2021c, *Public Transport Pricing*, Research paper, Canberra.
- 2021d, *Register of Foreign-owned Water Entitlements*, Report no. 98.
- 2021e, *Small business access to finance: The evolving lending market*, Canberra.
- 2021f, *Trade and Assistance Review 2019-20*, Annual Report Series, Canberra.
- 2021g, *Vulnerable Supply Chains*, Study Report, Canberra.
- 2021h, *Working from home*, Commission Research Paper, Canberra.
- 2022b, *5-year Productivity Inquiry: The Key to Prosperity*, Interim Report 1, Canberra, July.
- 2022c, *Aged Care Employment*, Interim Report.
- 2022d, *Compliance Costs of 'Nuisance' Tariffs*, Research Report.
- 2022e, *In need of repair: The National Housing and Homelessness Agreement*, Study Report, Canberra.
- 2022f, *Trade and Assistance Review 2020-21*, Annual Report Series, Canberra.
- PCC (Parliamentary Counsel's Committee) 2022, *Heavy Vehicle Charges Model Law as at 10 June 2022: As approved by the Transport and Infrastructure Council*.
- Phibbs, P. and Gurrán, N. 2021, 'The role and significance of planning in the determination of house prices in Australia: Recent policy debates', *Environment and Planning A: Economy and Space*, vol. 53, no. 3, pp. 457–479.
- Rossi-Hansberg, E., Sarte, P.-D. and Trachter, N. 2020, *Diverging Trends in National and Local Concentration*, NBER book chapter series, no. c14475, National Bureau of Economic Research, Cambridge, Mass.
- Ruta, M. (ed) 2022, *The Impact of the War in Ukraine on Global Trade and Investment*, World Bank, Washington, DC, <https://openknowledge.worldbank.org/handle/10986/37359> (accessed 15 September 2022).
- Santos, G. and Caranzo, A. 2022, 'Potential distributional impacts of road pricing: A case study', *Case Studies on Transport Policy*, vol. 10, no. 1, pp. 1–31.
- Shiran, S.J. 2020, *Impacts of Stamp Duty on Residential Mobility and Travel Behaviour*, Doctoral Thesis, RMIT.
- Sims, R. 2021, 'Protecting and promoting competition in Australia', presented at Competition and Consumer Workshop 2021 - Law Council of Australia, Australian Competition and Consumer Commission, 27 August.
- Singichetti, B., Conklin, J.L., Hassmiller Lich, K., Sabounchi, N.S. and Naumann, R.B. 2021, 'Congestion Pricing Policies and Safety Implications: a Scoping Review', *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, vol. 98, no. 6, pp. 754–771.
- Sobeck, K., Breunig, R., and Evans, A. 2022, *Corporate income taxation in Australia: Theory, current practice and future policy directions*, Tax and Transfer Policy Institute, (TTPi) Policy Report No. 01-2022, Canberra.
- Stiglitz, J.E. 2022, 'Getting Deglobalization Right', *Project Syndicate*.
- The Economist* 2010, 'Picking winners, saving losers', 5 August.
- The Economist* 2022, 'Many countries are seeing a revival of industrial policy', 10 January.
- The Port of Melbourne 2021, *Submission to Productivity Commission Vulnerable Supply Chains Study*.
- Therapeutic Goods Administration 2020, *Overview of program status for the MMDR reforms*, <https://www.tga.gov.au/hubs/mmdr/overview-program-status-mmdr-reforms> (accessed 26 August 2022).
- Transport for London 2023, *Discounts and exemptions*, <https://tfl.gov.uk/modes/driving/congestion-charge/discounts-and-exemptions> (accessed 31 January 2023).
- Treasury 2021, *Australia's foreign investment policy*, Canberra, https://firb.gov.au/sites/firb.gov.au/files/2021-01/Australias_foreign_investment_policy.pdf (accessed 15 September 2022).
- nd, *Payment Times Reporting Scheme*, <https://treasury.gov.au/small-business/PTRS> (accessed 2 February 2023).
- TWU (Transport Workers' Union) 2022, *TWU Wins Enforceable Rates for Couriers & Amazon Flex Drivers in Landmark Decision*, Media Release, Feb 18.
- UNESCAP (United Nations Economic Commission for Asia and the Pacific) 2019, *Asia-Pacific Trade and Investment Report 2019: Navigating non-tariff measures towards sustainable development*, <https://www.unescap.org/publications/APTIR2019#> (accessed 25 August 2022).
- 2022, *Digital and sustainable trade facilitation: Global report 2021*, United Nations, <https://repository.unescap.org/handle/20.500.12870/4216> (accessed 15 September 2022).
- US Department of Commerce nd, *Australia - Country Commercial Guide: Standards for Trade*,

<https://www.trade.gov/country-commercial-guides/australia-standards-trade> (accessed 28 January 2023).

US Government (Office of the United States Trade Representative) nd, *Trade in Services Agreement*, <https://ustr.gov/TiSA> (accessed 23 March 2022).

Victorian Government nd, *Accessibility of gaming machines*, <https://www.justice.vic.gov.au/justice-system/laws-and-regulation/accessibility-of-gaming-machines> (accessed 2 February 2023).

Wainscoat, L. and Twort, N. 2022, *Is competition really weakening in Australia*, <https://houstonkemp.com/miscellaneous/is-competition-really-weakening-in-australia/> (accessed 6 September 2022).

World Bank 2022a, *Foreign direct investment*, <https://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS?end=2020&locations=AU-OE-US-EU&start=2010&view=chart> (accessed 11 September 2022).

——— 2022b, *World bank open data*, <https://data.worldbank.org/> (accessed 15 September 2022).

WTO 2019, *Australia - Anti-Dumping Measures on A4 Copy Paper*, WT/DS529/R.

——— 2022a, *Australia - Anti-Dumping and Countervailing Duty Measures on Certain Products from China*, https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds603_e.htm (accessed 22 March 2022).

——— 2021, *World Trade Report 2021*, World Trade Organization, Geneva.

——— 2022b, *WTO Stats*, <https://stats.wto.org/> (accessed 11 September 2022).

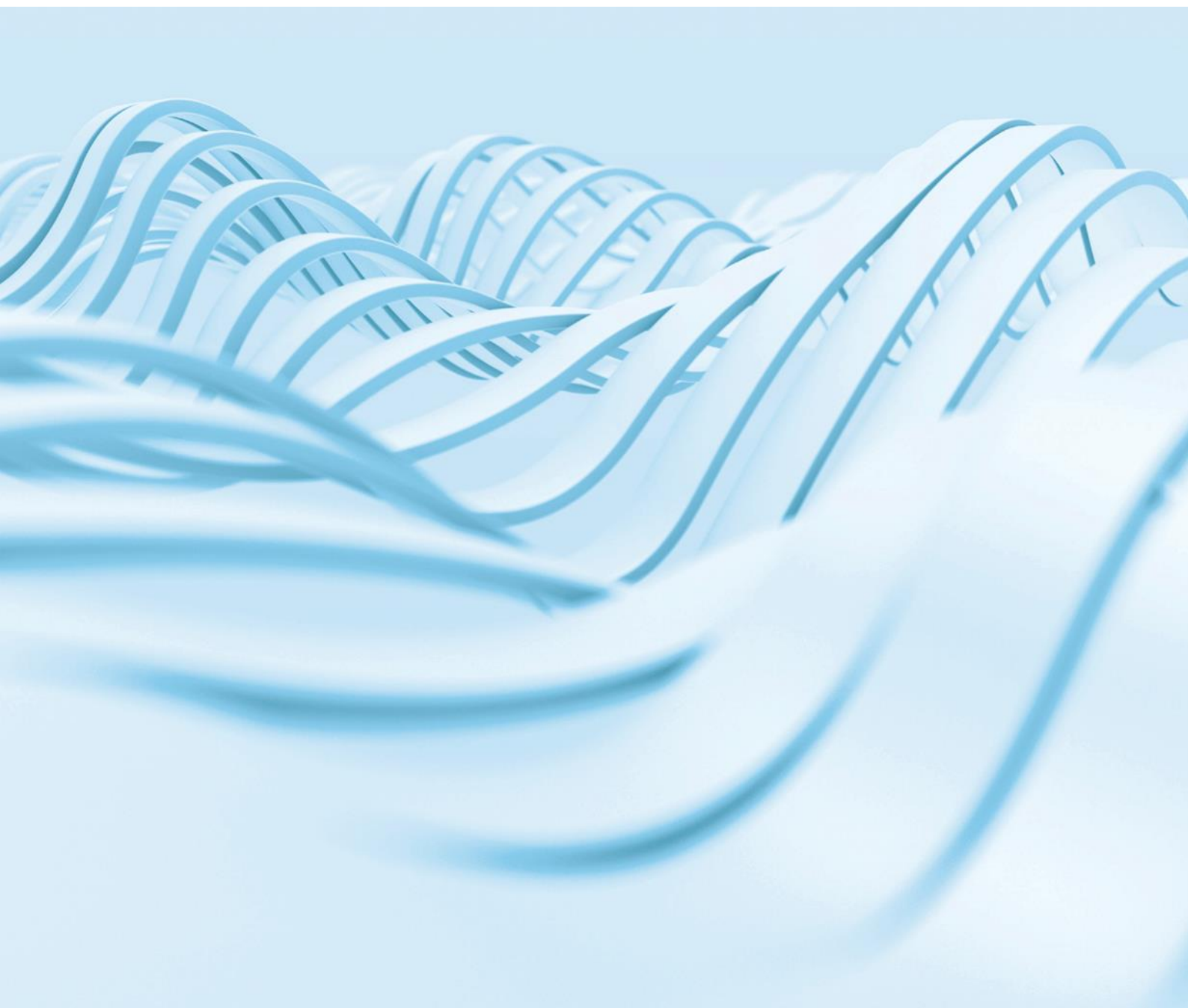
Yellen, J. 2022, *Remarks by Secretary of the Treasury Janet L. Yellen at LG Sciencepark*, US Department of the Treasury, <https://home.treasury.gov/news/press-releases/jy0880> (accessed 14 September 2022).

Yong, J., Yang, O., Zhang, Y. and Scott, A. 2020, *The Role of Market and Competition in Aged Care Responses to Aged Care Royal Commission Counsel Assisting's final submissions*, Melbourne Institute: Applied Economic & Social Research.



5-year Productivity Inquiry: Australia's data and digital dividend

Inquiry report – *volume 4*



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The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

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ISSN 1447-1337 (online)

ISSN 1447-1329 (print)

ISBN 978-1-74037-759-1 (set)

ISBN 978-1-74037-763-8 (volume 4)

An appropriate reference for this publication is:

Productivity Commission 2023, *5-year Productivity Inquiry: Australia's data and digital dividend*, Vol. 4, Inquiry Report no. 100, Canberra

Publication enquiries:

Media, Publications and Web | phone 03 9653 2244 | email publications@pc.gov.au

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The Commission's report is divided into 9 volumes: an overview document (volume 1) that presents our policy agenda, and inquiry content volumes (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda, including a modelling appendix. The full report is available from www.pc.gov.au.

Preface

Digital technology and data have transformed our economy and society. In just a couple of decades, smartphones have become ubiquitous, social media has changed the way we communicate and consume content and the volume of data we produce has increased exponentially. These trends have accelerated following the COVID-19 pandemic — e-commerce via online retail purchases, online delivery of human services and digitally enabled work from home are now widespread across Australia.

The **benefits for productivity of increasing digitisation are diverse and diffuse**. In many cases, they arise from technology enabling us to collect, transmit and analyse data more cheaply and quickly than ever before. Consumers can now easily search for products that best meet their preferences and verify product quality through online information. Businesses can deliver services more flexibly and efficiently as technology and data enable faster adjustments, increased scale at lower cost and innovation opportunities. And governments can make better-informed decisions about policy design and implementation, both at the system level and to address local community needs.

Crucially, **many of these benefits are particularly evident in services sectors**, which have historically had more difficulty achieving productivity growth. The positive impacts of digitisation and data use can also extend beyond productivity, by improving economic and social inclusion and living standards more broadly.

Australians are already adopting digital and data tools as they recognise the potential gains. Almost all businesses are connected to the internet, over half have a web presence, 68% have placed orders over the internet and 57% have adopted cloud technology. Growing adoption often follows from businesses' (and individuals') private assessments that the benefits of technology and data use exceed the costs, with little government support required.

Nonetheless, Australia's digital and data transformation is far from complete. Technology changes rapidly and **new productivity-enhancing applications are continuously emerging**.

Technologies such as artificial intelligence (AI), the internet of things (IoT), robotic automation and big data analytics could revolutionise how businesses operate across the economy — and, indeed, are already disrupting various sectors. The productivity gains can be significant, from robot-assisted warehouses that automate online order fulfilment and reduce accidents, to AI-enabled IoT sensors installed in smart cities that allow real-time optimisation of infrastructure, energy and service use and maintenance notification.

Many of these emerging digital and data applications do not merely lead to cost reductions, but can also result in better-quality goods and services and more product choice for consumers. Australia needs to **keep pace with technological developments** to underpin our future economic prosperity.

However, several factors could limit further adoption among Australian businesses — **inadequate internet, lack of skills, low awareness and uncertainty about benefits, security concerns, cost and legacy systems** are identified as barriers. And while we do well compared with other developed economies on foundational aspects of technology and data use (such as internet connections and data volumes), we are falling behind on some more advanced indicators. Australia's internet speeds are relatively low and business use of data-driven technologies, such as AI and analytics, trails uptake in other countries.

Some of these issues will be resolved with further technological progress, as has occurred with previous changes. Emerging applications of technology will become more widely known, and growing awareness of

their uses and benefits will facilitate more uptake as adoption shifts from the small share of early innovators to the mainstream majority of businesses (moving up the technology adoption ‘S curve’). The costs of implementing new digital and data solutions are also likely to decrease over time, as computing power continues to improve and economies of scale increase with adoption, and as basic digital skills in the population are improved with each successive generation.

But in other instances, **government can play a role in facilitating more and better use of technology and data**. This is particularly the case when government agencies provide, regulate or fund a service, or when the factors limiting uptake are systemwide issues that can be addressed through broader policy enablers, such as incentive frameworks or access rights. In this volume, the Commission identifies three such enablers where government investments and policies provide foundations for adopting productivity-enhancing digital and data tools, and suggests potential improvements.

- **Digital infrastructure, particularly in regional and remote Australia**, is required to deliver productivity-enhancing access to low-cost and reliable internet for local businesses and workers, and increases social inclusion by ensuring that regional and remote Australians can access quality essential services and expertise that are increasingly available online. Government already invests in regional digital infrastructure, but current funding often lacks transparency and accountability. Transitioning to a technology-neutral tender mechanism for allocating funding when market conditions allow could increase efficiency and transparency while guaranteeing minimum service outcomes.
- **Data sharing and integration** has been an ongoing focus of the government. Recent progress includes the Consumer Data Right rollout, a new national regime for public sector data sharing and individual agency collaboration with the private sector such as the ATO’s pioneering partnerships with software providers. Implementing a more comprehensive system for sharing and using health data (with appropriate data security and privacy safeguards), as well as for other government-funded services, would create new opportunities for data-enabled productivity gains.
- **Technical digital and data skills** are increasingly demanded not just in Australia’s technology sector, but by businesses across all industries as economic and social activity becomes more digitised (particularly since COVID-19). Many formal and informal education and training options exist, with employers and workers already using these to meet their skill needs over time. Migration policy can also play a major role in providing skilled workers who have sophisticated digital and data capabilities developed overseas, and this policy may be used to address immediate workforce gaps or obtain skills that are difficult to develop locally.

Beyond these areas, community trust in new applications of technology is critical for future uptake, as businesses and governments need to maintain their social licence to deliver digital and data-enabled services. Many factors contribute to building trust, and two important aspects are having **secure and ethical digital and data practices**. But organisations sometimes underinvest in these areas; for example, smaller businesses in particular may lack the expertise to invest in cyber security, potentially creating broader vulnerabilities and undermining trust, which ultimately stymies adoption. Governments can play a role in supporting secure and ethical uses of technology and data — for instance by regulating high-risk settings — but intervention should be carefully balanced to avoid discouraging private sector investment and innovation.

Digital technology and data will continue to shape global economic growth and social change over the coming years. Whether Australia fully realises the productivity dividend arising from these opportunities depends on how effectively governments, businesses and individuals can recognise and safely harness these changes for our own benefit. This volume of the 5 Year Productivity Inquiry presents the Commission’s findings and recommendations for government to support future data and digital activity.

1. Use of digital technology and data in the Australian economy

Key points

- ✳ **Digital technology and data have the potential to significantly improve Australia's productivity.**
 - Digital technology and data can reduce business production costs. Examples include lowering search costs (e.g. algorithmic search engines compared with manual search), transportation costs (e.g. using digital tools to generate and transmit data rather than paper records) and verification costs (e.g. establishing identity and reputation online instead of in person).
 - Greater use of digital technology and data can improve product quality and consumer choice, particularly in the services sector. Millions of phone apps, online banking, telehealth consultations, computer-assisted services such as counselling, and entertainment streaming services are examples of improved and/or new products enabled by technology and data.
- ✳ **Digital technology and data use has steadily increased for much of the past decade, as more businesses and consumers recognise the benefits of digitisation. COVID-19 accelerated this trend — many businesses were forced to operate only online, such as retailers making online sales, and more people worked from home.**
- ✳ **Businesses face benefits and costs from adopting digital and data tools that likely vary based on characteristics such as their size and industry. This could explain the variation in the rates at which technologies diffuse across the economy, and may affect dispersion in business performance.**
 - Larger businesses are more likely to adopt digital and data tools than small businesses.
 - Businesses in regional or remote areas are less likely than businesses located in cities to use customer relationship management and enterprise resource planning software.
 - The type of technology adopted and its relevance varies between industries. For example, knowledge intensive service businesses are more likely to use artificial intelligence (AI), while businesses in industries that are reliant on physical equipment are more likely to use radio frequency identification tags.
- ✳ **Compared with other developed countries, Australia does well on basic measures of technology and data uptake, but is falling behind on more advanced uses. This could limit future productivity growth.**
 - Australia has relatively high internet coverage and data download volumes.
 - Australia's internet speeds and use of AI and data analytics are relatively low.

1.1 Economic gains from using technology and data

Digital technology and data are two separate — though sometimes related — concepts.

- Digital technologies are electronic or computerised devices and systems that usually enable repetitive, and often time-consuming, operations to be undertaken more quickly (and sometimes more safely and robustly), such as through online or automated methods.
- Data refers to 'representations of facts that are stored or transmitted as qualified or quantified symbols. It comprises material such as characters, text, words, numbers, pictures, sound or video' (PC 2017a, p. 54).

The two are increasingly related because while data does not require technology (for example, a patient's medical history handwritten by their doctor on paper is still data), digital tools and systems have enabled large amounts of data to be gathered, stored, organised and analysed. Globally, the amount of digital data being generated is increasing at an incredible rate, with estimates that 'the present rate of digital content production is about 2.5 quintillion digital data bytes produced every day on Earth' (Vopson 2020, p. 1).

Researchers observe that:

... technology has lowered the cost of collecting, distributing and using data ... [and] many firms are exploring and experimenting with these technologies. They can potentially generate many benefits for producers and users. (Duch-Brown, Martens and Mueller-Langer 2017, p. 4)

In this manner, digital technology and data often combine to create value: data's value is enhanced because of what can be done with it using technology; technology has value in part because its use can generate digital data and because of its role in storing, processing and analysing data.

There are a range of technologies that are causing, or have the potential to cause, rapid changes in the way our economy and society functions — both by virtue of the technology itself and because of what it enables us to do with data (box 1.1).

Box 1.1 – Examples of potentially transformative technologies

Cloud computing is the delivery of computing services (such as data storage, networking and analytics) over the internet. It allows users to access these services on demand, often via a 'pay-as-you-go' model, which improves flexibility and can lower costs.

Artificial intelligence (AI) is the ability of computers to simulate human intelligence and perform associated tasks (such as speech recognition, moving objects and strategic decision making) in an automated fashion. Machine learning is a type of AI in which a computer algorithm automatically improves its predictions through more data and experience.

Data analytics uses data to gain insights for decision making. The data can come from anywhere, such as consumer purchasing behaviour, weather events, the stock market, the human genome or student test scores. Data analysis can be as simple as calculating averages, or can involve complex methods like machine learning. It also involves producing predictive statistics and data visualisations.

Blockchain is 'a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. An asset can be tangible (a house, car, cash, land) or intangible (intellectual property, patents, copyrights, branding)' (IBM nd). 'Web 3.0' aims to use blockchain technology to remove the centralised nature of the internet ('web 2.0') and increase security and trust.

Box 1.1 – Examples of potentially transformative technologies

The Internet of Things (IoT) involves ‘connecting any device... to the Internet and to other connected devices. The IoT is a giant network of connected things and people – all of which collect and share data’ (Clark 2016). Examples of IoT include connecting devices together in the home, using sensors to streamline production in a factory and using geolocated devices to improve road congestion.

Virtual reality uses computer simulation to allow users to interact with a virtual environment. Conversely, **augmented reality** superimposes digital images on the real world to facilitate interaction with the physical world. They can be used as interaction tools for digital twins to solve issues such as making human-robot collaboration safer (Pérez et al. 2020) or workflow problems (Havard et al. 2019).

Robotic process automation is the use of software that enables ‘bots’ to emulate human behaviour and complete automated tasks. This can be used in industries where simple and repetitive tasks can be automated such as data entry, addressing customer queries and automated internal communications. Bots are also finding applications in human services, such as for assessing healthcare consumers receiving care in their home (Medibank 2022).

3D printing is the process of creating solid objects from digital files. It can be used to create consumer and industrial products, as well as health products like dental implants and prosthetics.

Quantum computing utilises quantum mechanics to ‘solve problems too complex for classical computers’ (IBM nd). The exponential increase in computing power that quantum computing could offer would revolutionise AI and cyber security, make financial forecasting far more precise and vastly improve the efficiency of complex manufacturing (Bova, Goldfarb and Melko 2021).

How can digital technologies and data contribute to productivity?

Under a standard economic growth model, there are two main ways that digital technologies and the use of data contribute to the production process and therefore to economic activity. They can be thought of as direct inputs to the production process or as part of the ‘residual’ portion of output growth that cannot be attributed to capital or labour inputs.

Businesses can invest in digital technologies as capital inputs, including physical and tangible capital such as computer hardware, as well as intangible inputs such as software programs and ways to collect, store and analyse data. This capital is then used to produce goods and services — for example, a retailer uses their computer systems to manage supplier and customer orders, or a bank applies an algorithm to customer data to inform their loan assessment. Investing in digital technologies as capital inputs can substitute for labour inputs (such as by automating tasks previously done by workers), complement existing labour (for example, time-saving digital tools allow workers to do more value-adding tasks) or create different processes or outputs requiring more labour or new skills.

The classical economic production function sometimes refers to the residual, after capital and labour have been accounted for, as ‘technology’ (instead of ‘total factor productivity’). This concept is broader than the examples outlined in box 1.1 and captures the effects of all manner of technologies including ‘general purpose technologies’, which are ‘characterized by the potential for pervasive use in a wide range of sectors and by their technological dynamism’ (Bresnahan and Trajtenberg 1995). While computers and the internet are examples of such technologies, others predate the recent digital revolution and include the steam engine and electricity (Lipsey,

Carlaw and Bekar 2005). Such technology improvements can have a multiplier effect on output by increasing the productive potential of an economy for a given amount of capital and labour inputs. They can also facilitate complementary innovations; for example, computers are used for purposes well beyond their original function of performing complex mathematical calculations (Brynjolfsson and Hitt 2000).

Data is a unique input because, unlike most other production inputs such as materials and equipment, it is 'non-rivalrous': many agents can make use of the same data at the same time without it being "used up" or degraded (Smedes, Nguyen and Tenburren 2022, p. 3). This means that data can make a larger economic contribution than more traditional inputs, as multiple businesses can use the same data to produce different outputs. Research has found that businesses reporting the greatest growth in revenue and earnings received a significant proportion of that boost from data and analytics, with high-performing organisations three times more likely than others to say their data and analytics initiatives have contributed at least 20% to earnings before interest and taxes over the past three years (McKinsey 2019).

However, in many cases data can be made 'excludable' — it is usually the way that data is stored and accessed that determines whether other parties can be excluded from using it. For example, data may be encrypted or a private entity that collects data may choose not to share it for others to use. Sometimes this is desirable because it provides incentives for collecting data, such as businesses gathering customer data to improve their products and gain a competitive advantage. At the same time, excluding others from accessing and using data can mean that the value of data as an input to the production process is not fully realised (section 2.2).

In addition to their role as production inputs, both digital technology and data can be considered as the outputs of production in some contexts. For example, software companies produce digital applications as their output, which can either be sold directly to consumers or used as inputs by other businesses that wish to automate their processes but do not have the technological capabilities to create their own applications. And the media content produced by streaming services represents data that is these companies' output — with a consumer's selection of which content they view, becoming data used by companies as an input to preview future content for that consumer.

Better use of technology and data can improve productivity ...

Businesses can use digital tools, often in combination with data, to reduce their production costs, although this may not immediately translate to productivity growth due to lags in price adjustments (Basu, Fernald and Kimball 2006). Various researchers have found positive relationships between technology adoption and productivity or GDP growth (box 1.2), and Goldfarb and Tucker (2019) outline a range of channels through which technology can lower businesses' costs.

- Search costs — the internet makes it easier to find information and therefore lowers search costs for both customers and businesses. Moreover, algorithmic search engines use data to improve the relevance and accuracy of search results, further reducing these costs.
- Replication costs — processes using digital technologies can have low marginal costs after the fixed costs of development and implementation are incurred. For example, a bank that invests in technology to support its risk assessments can readily scale this across multiple customers and products.
- Transportation costs — there are near-zero costs associated with transporting digitised data over the internet, compared with higher costs of transporting (for example) paper-based records. This also has implications for the location of people, as technology enables geographically isolated individuals and companies to connect at lower cost, facilitating new employment models such as offshoring.
- Tracking costs — digital tools can help businesses to keep track of relevant data from customers and suppliers at lower cost, though better tracking has also made privacy a key issue. Analysing this data can help businesses to streamline production or distribution.

- Verification costs — technology and new data sources can make it easier to verify the identity and reputation of another party in a business transaction, so that it is less costly to build trust between parties (for example, less need for repeated interactions).

Box 1.2 – Technology and productivity: empirical evidence from previous research

Studies from a range of countries have found a positive relationship between technology adoption and productivity or GDP growth. In several cases, the evidence suggests that the economic benefits from using technology are larger for businesses that have also invested in complementary areas, such as management capabilities and data assets.

- Gal et al. (2019) looked at the effect of technology adoption on productivity in 19 EU countries and Turkey, finding that ‘an industry environment characterised by high digital adoption rates is associated with higher [multifactor productivity] growth in the average firm’ (Gal et al. 2019, p. 18). The research also found evidence that the gains from digital technology are dependent on ‘intangible assets and skills (e.g. data, tacit knowledge, organisational capital) and complementary additional investments in these factors’ (Gal et al. 2019, p. 31).
- Vu (2013) examined the impact of ICT on Singapore’s GDP and average labour productivity (ALP) growth. The research found that ‘ICT capital played a substantial role in Singapore’s growth, contributing 1.0 percentage point to GDP growth and 0.8 percentage points to ALP growth in 1990-2008’ (Vu 2013, p. 18).
- Bloom, Sadun and Reenen (2012) investigated the relationship between technology and labour productivity for multinational companies. Doubling the IT stock was associated with a 6.3% labour productivity increase for US multinationals and 4.6% for non-US multinationals (Bloom, Sadun and Reenen 2012, p. 180). The researchers also demonstrated that the higher productivity gains for US multinationals were attributable to better management practices, which complemented IT investment.
- Borowiecki et al. (2021) studied the effects of digitisation on firm productivity in the Netherlands, finding positive and significant productivity impacts from investment in ICT hardware and intangibles (as measured by levels of digital skill intensity). Their results held using both labour productivity and multifactor productivity as the measure of productivity.
- Qu, Simes and O’Mahony (2017) examined the relationship between economic activity and technology use, measured through internet access and mobile phone penetration, in 37 countries. They found that from 2004 to 2014, after controlling for other inputs such as physical and human capital, ‘the diffusion of digital technologies significantly improved economic output in Australia and abroad, contributing to steady-state gross domestic product per capita growth of approximately 5.8% on average [over the whole decade]’ (Qu, Simes and O’Mahony 2017, p. 57).

The capacity of businesses to use new technologies and the impact on their performance varies with their characteristics and capabilities, which leads to heterogenous uptake of digital technology and data use (discussed in more detail below). The complex variety of benefits that can stem from using multiple technologies in combination also contributes to this heterogeneity; as do differences in the nature of the available data that can be analysed using digital tools.

For example, industries that make greater use of equipment could be more likely to benefit from the Internet of Things (IoT) and sensors integrated into their equipment, such as resources companies using sensors to gather real-time data on their machinery to improve maintenance and operational performance (PMC 2021c,

p. 7). Technology has lowered the costs of gathering and transporting information, as well as the costs of tracking and monitoring their equipment. In contrast, industries that are centred on human decision making might be more likely to find applications for AI, such as banks investing in bill management algorithms or automating qualifying decisions on new customers and their loan limits (Agarwal, Singhal and Thomas 2021; CBA 2022). In these examples, technology has lowered the cost of verifying the customer information underpinning these decisions, and reduced replication costs for making these decisions across many customers.

This is not to say that particular technologies are exclusively used by businesses in specific industries; however, it does suggest that what data and digital adoption looks like will vary across the economy. Australian businesses' adoption of different data and digital tools and how this differs across industries is further examined below.

Real cost reductions are not the only way that digital and data enabled productivity improvements benefit Australians. The fruits of productivity growth can also be experienced as quality improvements – the things that get better (in measured and unmeasured ways); and new things – inventions so novel that they can be said not to have existed before and perhaps were not even conceived of by most people, but that create new value for society (Brennan 2021).

New uses of technology and data often lead to product improvements and greater choice, particularly in the services sectors, which have historically had more difficulty achieving productivity growth. Digitisation can create novel ways for customers to interact with businesses and service providers (such as online banking, telehealth consultations and computer-assisted services such as counselling) or even entirely new products (such as social networks, search engines, phone apps and streaming entertainment). Sometimes the main enabler of improvements is technology-driven cost reductions through one or more of the channels discussed above. In other instances, the key enabler is better use of data; the channels through which data itself provides economic benefits are discussed in section 2.2. Many significant changes have resulted from a combination of both, with the digitisation of data enabling benefits on a larger scale.

For example, the digital tools that have enabled businesses to track customer data at lower cost can also provide the means for businesses to offer more personalised goods and services that are tailored to an individual customer's needs. This results in a better-quality product for the customer while also sharpening allocative efficiency by improving business decision making about resource allocation. In this example, the substantial value that can be gained from collecting and analysing this data provides the rationale for many retailers to offer loyalty programs, some of which can span multiple product categories.



Finding 4.1

Technology and data are enablers of productivity growth

Digital technology, combined with data, can help businesses to improve their productivity by lowering the costs of search, replication, transportation, tracking and verification. It can also lead to productivity-enhancing product improvements and greater choice, particularly in services sectors, which have historically had more difficulty achieving productivity growth.

... but measuring the digital economy is challenging

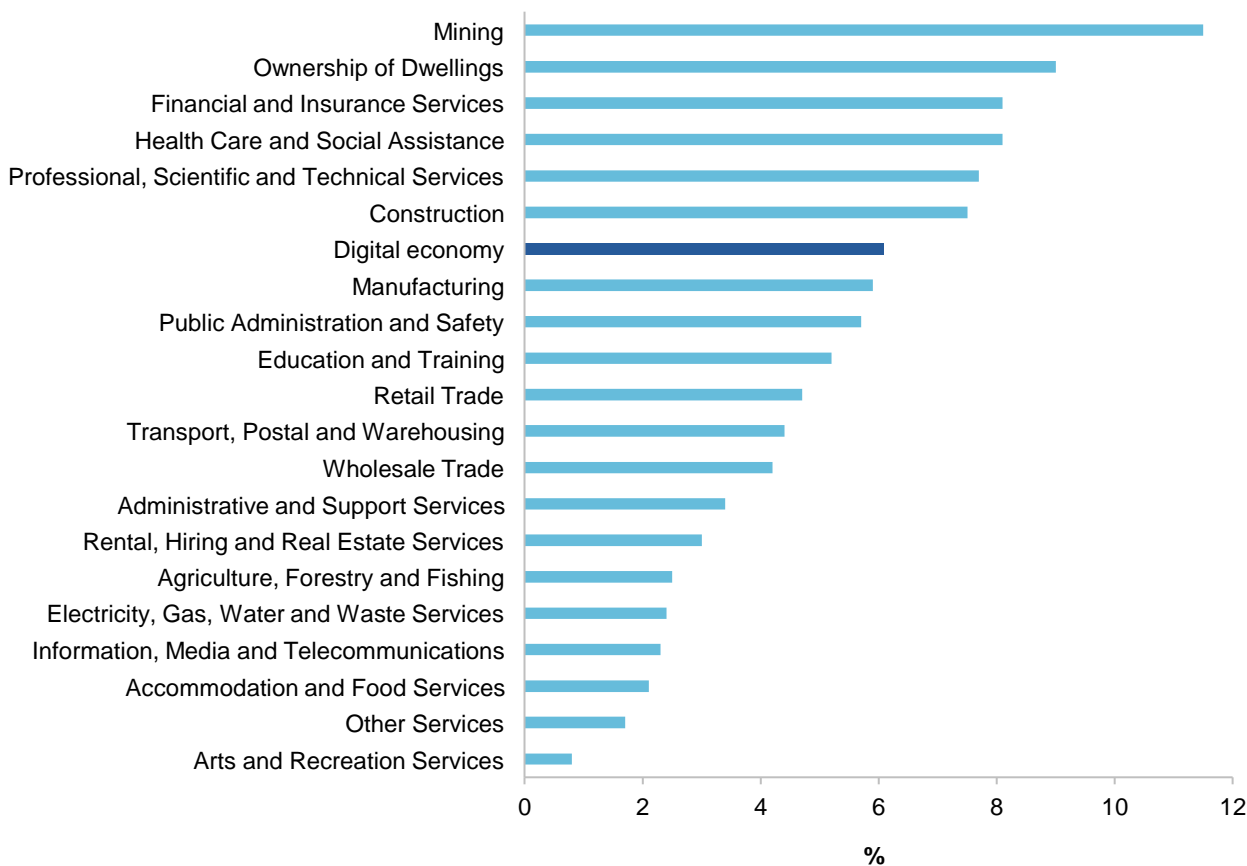
Given the many potential benefits of digital technologies and their applications in creating value from data, they are ubiquitous in one form or another throughout every part of Australia's economy.

There are many jobs, products and processes that can be identified as digital activities — such as IT support, computer product manufacturing and developing software. Taking together these observable components, the ABS reports that digital activities make a large economic contribution, representing about 6% of total value added in 2020-21 (figure 1.1). However, this is an underestimate of the economic value of digital technologies. The ABS's estimates reflect the output associated with products that are 'primarily digital in nature', but do not measure the economic value attributable to the ubiquitous and embedded use of technology in other products. For example, much of the mining industry's output depends on digital technology — Rio Tinto's Gudai-Darri mine in the Pilbara is one of the most technologically advanced in the world. It uses 'autonomous trucks, trains and drills, as well as the world's first autonomous water trucks, and a robotic ore sampling laboratory' (MCA 2022, p. 11).

Other estimates of the size of Australia's digital economy, or the contribution of technology to the economy, range from being similar in magnitude to ABS estimates in figure 1.1, to far in excess of these. These variations are partly attributable to differences in how digital technologies are conceptualised and how their impacts are measured.

- AlphaBeta examined the technology sector's contribution to Australia's GDP both directly — through industries such as internet publishing and computer system design, and internet related profit shares in wholesale and retail trade — and indirectly — based on estimating the share of profits and wages in other industries attributable to technology. They estimated that, combining direct and indirect contributions, the technology sector represents 6.6% of GDP (AlphaBeta 2019a, p. 11).
- The Tech Council of Australia estimated that technology sector activity contributed \$167 billion to Australia's GDP in 2020-21, representing 8.5% of Australia's total economic output (TCA, sub. 51, p. 1). Its estimates capture segments of the information media and telecommunications; professional, scientific and technical services; retail trade; and wholesale trade industries, which it observes have all outpaced average market sector industries' multifactor productivity growth in the decade to 2020-21 (TCA, sub. 51, p. 2).
- Oxford Economics and Huawei considered digital spillovers, which happen 'when technology accelerates knowledge transfer, business innovation, and performance improvement within a company, across supply chains and amongst industries' (Huawei and Oxford Economics 2017, p. 24). They estimated that digital spillovers could account for 13.1% of GDP in advanced economies.
- McKinsey estimated gains from the digital economy by examining technology-enabled cost reductions in particular industries — for example, that electronic medical records produced a 25% reduction in avoidable hospital readmission rates, and a 20% reduction in length of stay (Blackburn, Freeland and Gärtner 2017, p. 34) — then projecting the implications of increased digital adoption. They reported that digital technology has 'the potential to contribute between AU \$140 billion and AU \$250 billion to Australia's GDP by 2025, based on currently-available technology alone... [representing] an aggregate GDP increase over historical trend of roughly 10 percent by 2025' (Blackburn, Freeland and Gärtner 2017, p. 2,13).

Figure 1.1 – Digital activities represent 6% of Australia's total value added^{a,b}
Share of total value added by Australian industries (at current prices and with digital activity embedded), 2020-21^c



a. Digital activity is measured as the production of: computer hardware, software, telecommunications equipment and support services that form and facilitate the use of computer networks; digital audio, video and advertisement broadcasting services that can be created, accessed, stored or viewed on digital devices; and retail and wholesale services and margins from digitally ordered or platform enabled online transactions. **b.** For simplicity, the measurement focused on products that were 'primarily digital' in nature, and separately identifiable in the supply-use tables. **c.** The production of the digital products has not been removed from the existing industries for which it is partially embedded. Therefore, the shares add to more than 100% of aggregate value added.

Source: ABS (2022b).

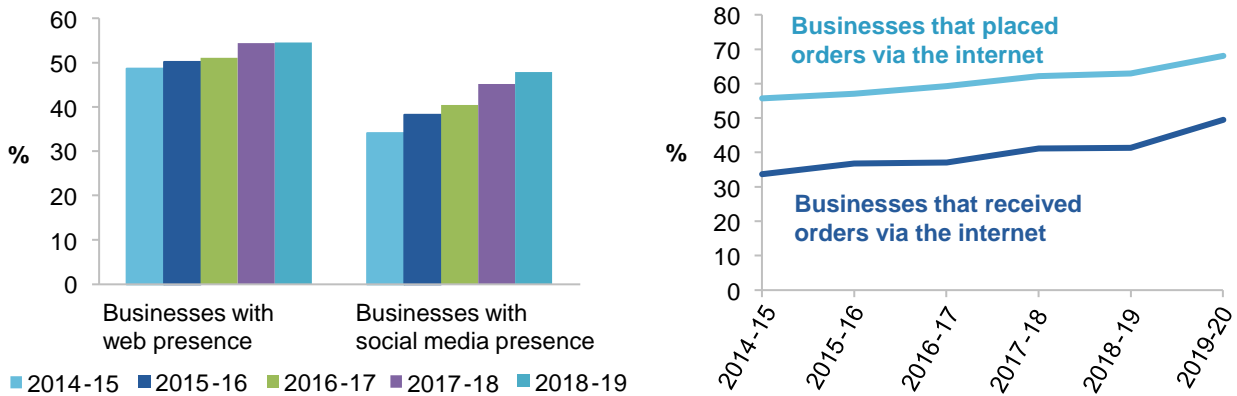
Businesses' use of technology and data has been increasing

The rising adoption of digital technologies reflects their direct economic benefits to businesses, but also the fact that most businesses cannot be part of the business ecosystem without digital tools. Merely achieving compliance with tax and many other regulations requires technology and, as such, almost all businesses have access to the internet.¹ And for many businesses, a web presence is essential to reaching customers: between 2014 and 2019, the share of businesses with a web presence increased from about 49% to 55%, and the share of businesses using e-commerce to either receive or place orders has also been rising (figure 1.2).

¹ Over 95% of Australian businesses had internet access in 2016-17, of which over 99% reported using broadband internet (ABS 2018).

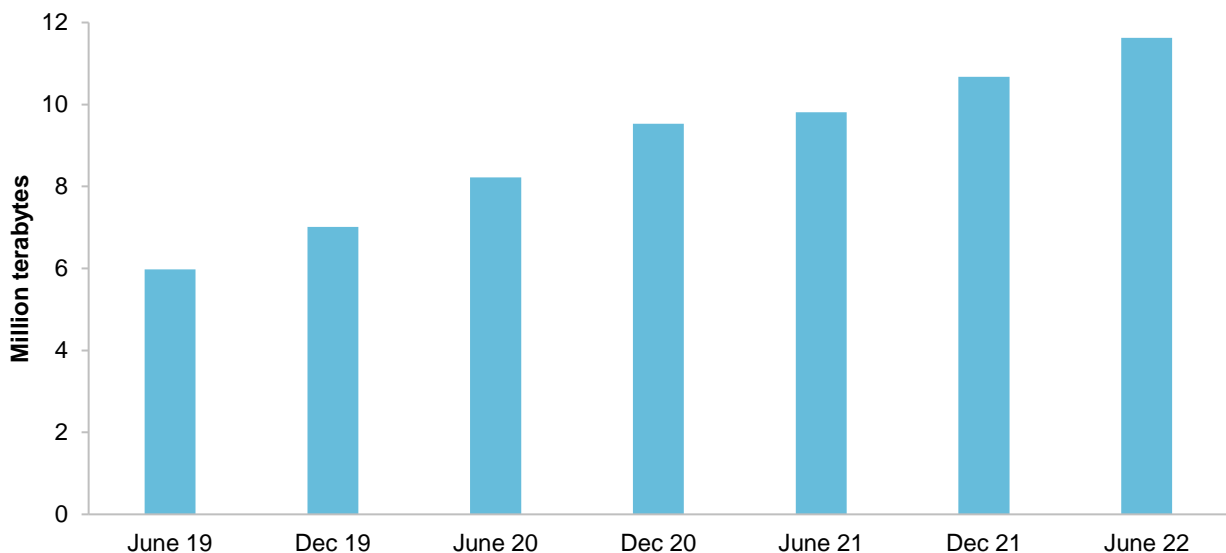
Data download volumes have also increased significantly over recent years. According to the ACCC’s *Internet Activity Report*, 11.6 million terabytes of data were downloaded across retail broadband internet and mobile services in the June 2022 quarter, up 94% from June 2019 (figure 1.3).

Figure 1.2 – Australian businesses increasingly operate online
Share of businesses with online presence, 2014-15 to 2018-19, and using e-commerce, 2014-15 to 2019-20



Source: ABS (*Characteristics of Australian Business*, 2019-20 financial year, Cat. no. 8167.0; *Business Use of Information Technology*, 2015-16 financial year, Cat. no. 8129.0; *Summary of IT Use and Innovation in Australian Business*, 2016-17 financial year, Cat. no. 8166.0).

Figure 1.3 – Data download volumes are rapidly growing
Total volume of data downloaded for retail NBN, retail non-NBN fixed and mobile services, June 2019 to June 2022



Source: ACCC (2022f).

COVID-19 and working from home accelerated digital uptake

Most recently, COVID-19 has accelerated technology use as many parts of the economy have had to conduct business online during the pandemic. This includes knowledge-based organisations transferring their existing digital processes from office-centric to online, retailers augmenting their physical sales with online sales, and various services being delivered digitally — for example, the COVID-19 pandemic necessitated a more rapid transition to eHealth, including online general practitioner (GP) consultations for routine medical services (KPMG, sub. 60, p. 14). The Australian Government's Digital Economy Strategy 2030 highlighted that almost 9 in 10 Australian businesses adopted new technologies during COVID-19 to support business continuity (PMC 2021c, p. 5).

Much of this technology adoption was necessary to allow workers (about 40% of Australia's workers) and businesses to operate from home (PC 2021c). The pandemic demonstrated that many jobs could be done from home just as well as from a traditional employer-owned location — such as office-based workers and jobs where workers use computers and other portable technology, rather than working with immovable structures, materials or equipment. Had this not been the case (that is, had the proportion of businesses and workers able to take up digital technologies to operate online and remotely been much smaller), Australia's economic activity and productivity would likely have taken a greater hit as a result of COVID-19 restrictions. According to an international analysis of workers' digital communication patterns, during the 2020 lockdowns the length of the average workday increased by about 8.2% relative to pre-pandemic levels, or almost 49 minutes (DeFilippis et al. 2020).

Although the long-term outcomes are unclear, the amount of work done from home is likely to remain much higher than it was before the pandemic. As COVID-19 restrictions have eased, hybrid work (with a portion of the week at home and a portion at the employer's site) has become a regular and expected part of many workplaces. Hybrid work comes with a variety of upsides and downsides for businesses and employees (PC 2021c). In terms of digital technologies, hybrid work may increase ongoing capital expenditure on equipment for home offices, such as laptops, headphones and software (including for videoconferencing and webinars). Businesses may also increase their investments in digital infrastructure, its maintenance and training in its use, to enable remote working to continue in tandem with activity at a workplace.

As firms and workers learn more about how to effectively work from home, the productivity and wages of those doing so are likely to improve. Those arrangements that facilitate higher productivity when working from home and in workplaces are likely to become more prevalent through the process of innovation and learning — via changing technology and business practices — albeit at an uncertain pace. Technological progress could be combined with the lessons from experimenting with different approaches to remote work, which would further reduce the costs of working from home. Better ways of facilitating collaboration and creativity could be found, mitigating the downsides of working from home on productivity. In addition, digital technology could give a broader range of occupations and industries the option of remote work, for all or part of their regular hours worked. More firms might move to being fully remote, but considerable momentum would likely come from firms moving from a fully centralised to hybrid model (or increasing the levels of work from home within hybrid models).

Uptake of foundational versus specialised technologies

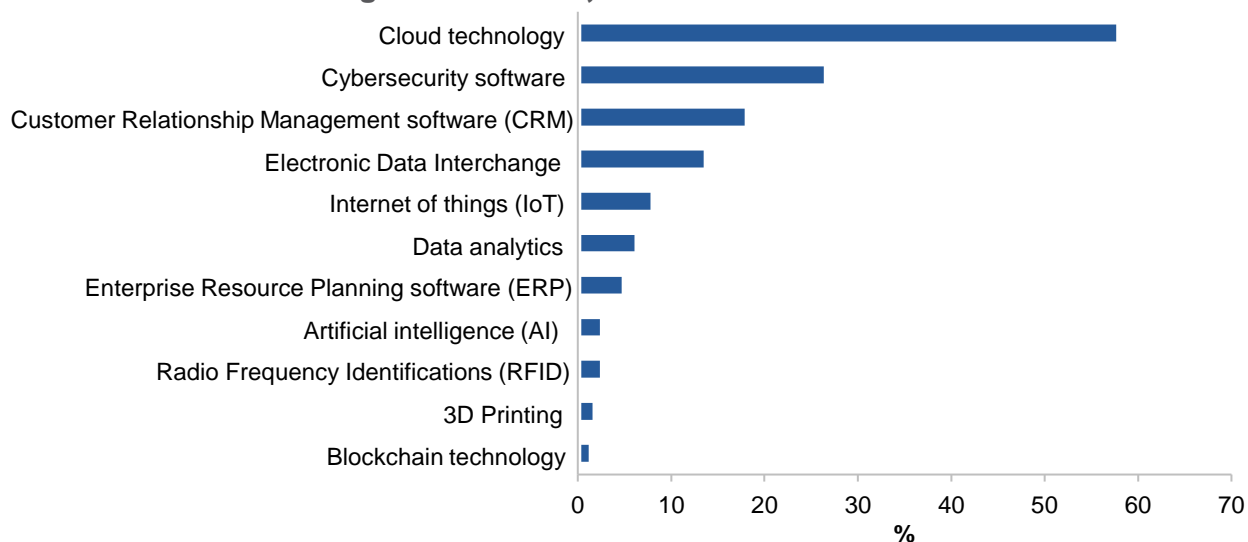
The level of technology uptake by Australian businesses varies across different types of digital and data tools. Adoption is typically higher for technologies that are foundational and have broader uses across a range of business applications. For example, 57% of Australian businesses reported using cloud technology

in the ABS's 2019-20 *Business Characteristics Survey*,² and more than one quarter of businesses reported using cyber security software (figure 1.4).

These foundational technologies have widespread applications and are often necessary to have in place when adopting more advanced types of digital and data tools. More specifically, cloud-based software can lead to significant productivity improvements in and of itself; for example, TechnologyOne submitted that 'a transition to consumption-based software [or cloud-based software-as-a-service] across key sectors over the next three years could realise \$224 billion in savings and uplift GDP by 1.3 percent above the base in 2030 (assuming a 2022 start date)' (TechnologyOne, sub. 66, p. 2). On average, 54% of these gains came from productivity-enhancing business process improvements and 32% from reduced technology costs.

Figure 1.4 – Technology uptake is higher for foundational tools

Share of businesses using different ICTs, 2019-20^a



a. This chart uses weighted estimates as published by the ABS.

Source: ABS (*Characteristics of Australian Business*, 2019-20 financial year, Cat. no. 8167.0).

Technologies that are relatively niche, require significant investment in equipment or labour to enable uptake, or are more complex to understand their potential benefits and use generally have lower business adoption. To the extent that these technologies have a narrower set of economic applications at present, it may be optimal for current take-up rates to be relatively low. These include 3D printing and blockchain, which were each reported to be used by about 1% of Australian businesses in 2019-20 (figure 1.4). Some other tools that either generate or require large volumes of data to be used effectively, such as artificial intelligence (AI), analytics and IoT, also had relatively low uptake.

The various factors that can lead to lower technology adoption by Australian businesses — for example cost, lack of staff capability and uncertainty about benefits — are discussed in section 2.1. In addition, the Business Characteristics Survey is self-reported data; therefore, its results on technology adoption partly reflect businesses' understanding of how they are using digital and data tools. This may be an underestimate if businesses do not recognise that they are using some forms of technology. For example, most Australian

² The Business Characteristics Survey is an annual survey that provides 'estimates in business use of information technology; innovation; and a broad range of other non-financial business characteristics' (ABS 2021b). The 2019-20 survey captured business conditions prior to COVID-19 and also during the start of the pandemic, as parts of Australia entered lockdown in early 2020.

businesses would make use of electronic data interchanges as tax returns are submitted electronically; however, some may not recognise this when responding to the survey. Similarly, businesses may indirectly use AI if it is embedded in their third-party software, but may not think to report this.

Adoption of technology is not the only condition required for businesses to get productivity benefits from digital and data tools. To maximise value, digital investments have to be integrated into a business's processes and broader production model. Poorly integrated technology can lead to duplication and additional costs; for example, a MYOB survey of small and medium enterprises found that surveyed businesses wasted, on average, 7 hours per week due to lack of integration, with this time spent on manual data entry, consistency checks or fixing errors (MYOB 2022, p. 5). In some cases, the frustrated business simply ditched its digital investment. These experiences further highlight the importance of skills, support and ease of integration for improving processes and subsequent technology uptake.



Finding 4.2

Australian businesses are increasingly using technology

Most Australian businesses make some use of digital tools, such as having a web presence, placing orders online and adopting cloud technology. COVID-19 accelerated technology use, with many businesses shifting to online sales or digitally delivered services. Technology adoption is highest for foundational tools such as cloud technology and cyber security software. To the extent that some technologies (such as 3D printing and blockchain) may have a narrower set of economic applications, it could be optimal for take-up rates to be relatively low at present.

Different adoption rates likely reflect heterogenous benefits and costs

There is variation in adoption rates for each type of technology, depending on business characteristics. As discussed above, heterogenous uptake of digital and data tools is to be expected because businesses of different sizes and industries are likely to derive different benefits and costs from using a specific technology. This in turn affects how quickly or slowly a given technology diffuses across Australian businesses which, given the evidence suggesting a positive relationship between technology adoption and productivity (box 1.2), could affect the dispersion of business performance across the economy. The Commission found that, holding all other characteristics constant:³

- larger businesses were significantly more likely than smaller businesses to have adopted digital and data tools across almost all surveyed technologies, with uptake being highest among the largest businesses with 200 or more employees. Consistent with this, the Australian Small Business and Family Enterprise Ombudsman has stated that 'small business managers are not always as supportive of technology adoption compared to larger businesses' (ASBFEO, sub. 64, p. 3)

³ To understand the business characteristics driving differences in technology adoption, the Commission has undertaken regression analysis using the ABS's *Business Characteristics Survey* data. Logistic regressions were estimated to identify which characteristics were relatively more important for explaining digital and data uptake across the 11 technologies that businesses were surveyed about in 2019-20. The variations reported here are for characteristics estimated to be statistically significant at the 5% level, holding all other characteristics constant (for example, the results on varying location are after controlling for business size and industry). Further details about the regression specification and results tables are provided in appendix A.

- businesses in regional and remote Australia were significantly less likely than businesses located in cities to use customer relationship management and enterprise resource planning software. However, business location generally had limited explanatory power in affecting other types of technology uptake
- there were many statistically significant variations in how businesses across different industries adopted different technologies.

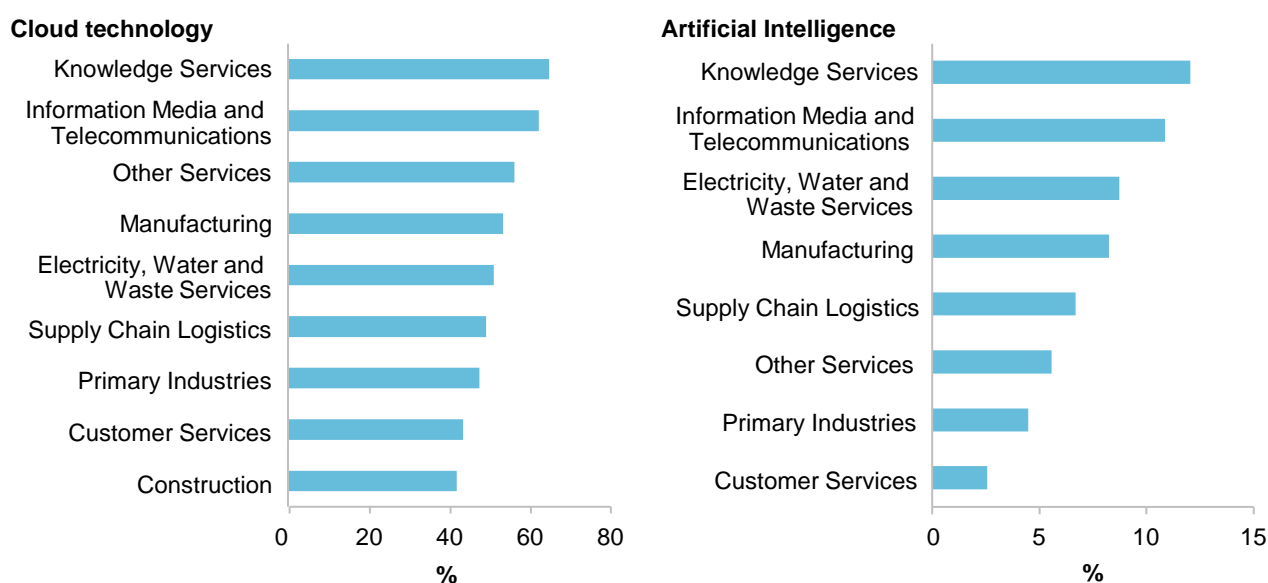
Businesses in knowledge services and information media and telecommunications were more likely to use cloud technology, with over 60% adoption by businesses within these industries in 2019-20 (figure 1.5). These industries are relatively knowledge intensive and require use of digital tools and computing power to produce outputs, and are therefore well-placed to benefit from using cloud technology. At the same time, even in industries with relatively lower cloud uptake, the adoption rate, in absolute terms, is still substantial — about 40% of businesses in construction and customer services use cloud technology.

This likely reflects the broader benefits of cloud technology as it has many basic applications that are relevant for all industries, such as storing and accessing information, as well as more complex uses that may be more relevant for knowledge-intensive industries, such as to access more processing power and enable the use of other technologies such as AI or data analytics. Previous research has found that a higher proportion of businesses adopt cloud technology for basic uses, such as software applications and data storage, reflecting the early stage of adoption by many businesses — but that cloud services will also have a foundational role in enabling next wave technologies (DAE 2019b, p. 4).

Consistent with this, industries with higher uptake of cloud technology also had higher adoption of AI. Businesses in the knowledge services and information media and telecommunications industries were more likely to be using AI, with adoption rates of more than 10% in 2019-20 (figure 1.5). Businesses that have been early adopters of AI are likely to have been those that stand to gain significant benefits from their use. A 2019 industry survey found that 56% of AI early adopters in Australia believe AI is very or critically important to their company's success now, and 79% believe this will be the case within two years (Deloitte Insights 2019, p. 8,10).

Figure 1.5 – Cloud and AI have higher adoption in knowledge-intensive industries

Share of businesses using selected technologies by industry, 2019-20^{a,b,c}



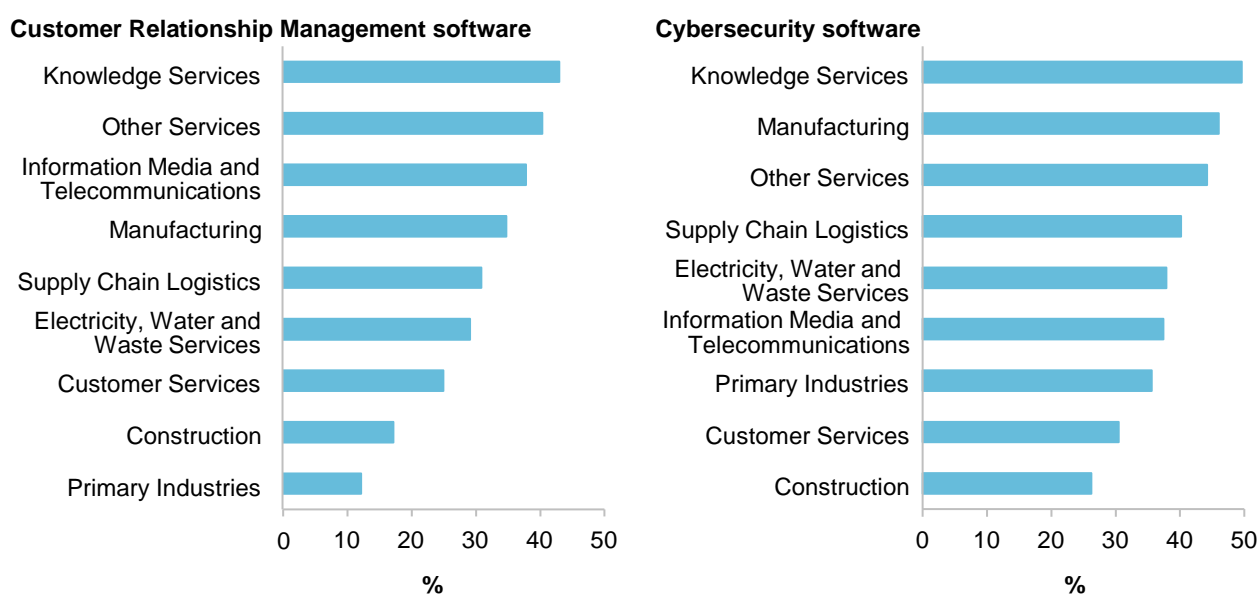
a. Some ANZSIC 2006 divisions have been grouped for this analysis. 'Customer services' includes retail trade; accommodation and food services; and other services. 'Knowledge services' includes finance and insurance services; and professional, scientific and technical services. 'Other services' includes administrative and support services; healthcare and social assistance; arts and recreation services; and rental, hiring and real estate services. 'Primary industries' includes agriculture, forestry and fishing; and mining. 'Supply chain logistics' includes wholesale trade; and transport, postal and warehousing. The Business Characteristics Survey does not capture businesses in the Education and Training and Public Administration and Safety industries. b. These results are unweighted so are not directly comparable with the weighted estimates in figure 1.4. c. Construction industry adoption of AI unable to be reported due to sample size constraints.

Source: Productivity Commission estimates using data in the ABS's Business Longitudinal Analysis Data Environment.

Knowledge services businesses were also the most likely out of all industries to adopt customer relationship management (CRM) and cyber security software in 2019-20 (figure 1.6). Use of these digital tools by businesses in other industries varied substantially, potentially reflecting the complexity of their customer interactions (for CRM software) and their vulnerability to or awareness of cyber security risks (for cyber security software). However, some businesses may be underinvesting in cyber security due to underestimating the likelihood or total costs of a security breach, as discussed in section 2.2.

Figure 1.6 – Knowledge services businesses are the largest adopters of CRM and security software

Share of businesses using CRM and cybersecurity software by industry, 2019-20^{a,b}



a. Some ANZSIC 2006 divisions have been grouped for this analysis. 'Customer services' includes retail trade; accommodation and food services; and other services. 'Knowledge services' includes finance and insurance services; and professional, scientific and technical services. 'Other services' includes administrative and support services; healthcare and social assistance; arts and recreation services; and rental, hiring and real estate services. 'Primary industries' includes agriculture, forestry and fishing; and mining. 'Supply chain logistics' includes wholesale trade; and transport, postal and warehousing. The Business Characteristics Survey does not capture businesses in the Education and Training and Public Administration and Safety industries. b. These results are unweighted so are not directly comparable with the weighted estimates in figure 1.4.

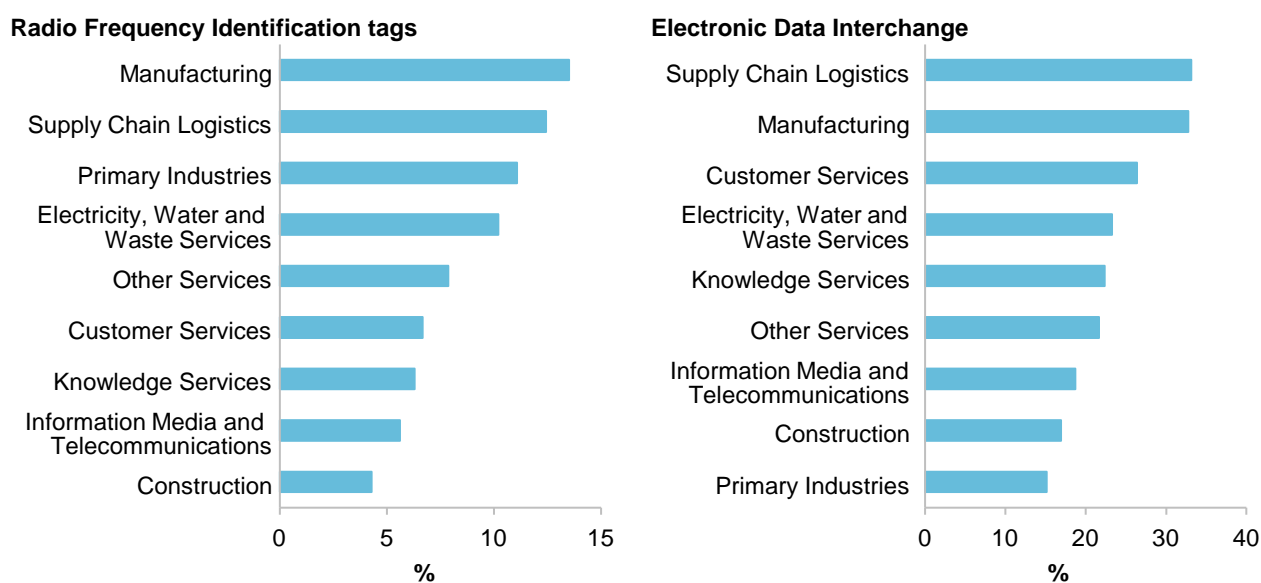
Source: Productivity Commission estimates using data in the ABS's Business Longitudinal Analysis Data Environment.

Businesses in the manufacturing, supply chain logistics and primary industries were more likely than others to use radio frequency identification (RFID) tags (figure 1.7). Higher adoption in these industries is likely to reflect the relatively greater gains to these businesses from using RFID tags to automatically identify and track objects. As discussed above, industries that make greater use of equipment — or have more requirements to physically move inputs and outputs as part of their production processes — are better placed to benefit from the cost reductions associated with this type of technology. There is significant potential for economic gain; for example, according to the Minerals Council of Australia, ‘adoption of digital and technological innovation has the potential to deliver significant productivity improvements of up to 23% to the Australian mining industry by 2030’ (MCA, sub. 55, p. 17).

Supply chain logistics and manufacturing businesses also have relatively higher uptake of electronic data interchange (EDI) tools, an established technology that includes real-time computer-to-computer exchange of transaction data such as invoices and purchase orders (figure 1.7). This is consistent with EDI enabling more efficient tracking of inputs and suppliers, and outputs and customers, which is particularly valuable for industries with complex production workflows and linkages, so they can lower costs and optimise decision making across their systems and processes (Min 2000).

Figure 1.7 – Manufacturing and supply chain logistics industries have the highest adoption of RFID tags and EDI tools

Share of businesses using RFID tags and EDI by industry, 2019-20^{a,b}



a. Some ANZSIC 2006 divisions have been grouped for this analysis. ‘Customer services’ includes retail trade; accommodation and food services; and other services. ‘Knowledge services’ includes finance and insurance services; and professional, scientific and technical services. ‘Other services’ includes administrative and support services; healthcare and social assistance; arts and recreation services; and rental, hiring and real estate services. ‘Primary industries’ includes agriculture, forestry and fishing; and mining. ‘Supply chain logistics’ includes wholesale trade; and transport, postal and warehousing. The Business Characteristics Survey does not capture businesses in the Education and Training and Public Administration and Safety industries. **b.** These results are unweighted so are not directly comparable with the weighted estimates in figure 1.4. **c.** Electricity, Water and Waste Services. **d.** Information Media and Telecommunications.

Source: Productivity Commission estimates using data in the ABS’s Business Longitudinal Analysis Data Environment.



Finding 4.3

Businesses in different industries adopt different digital tools

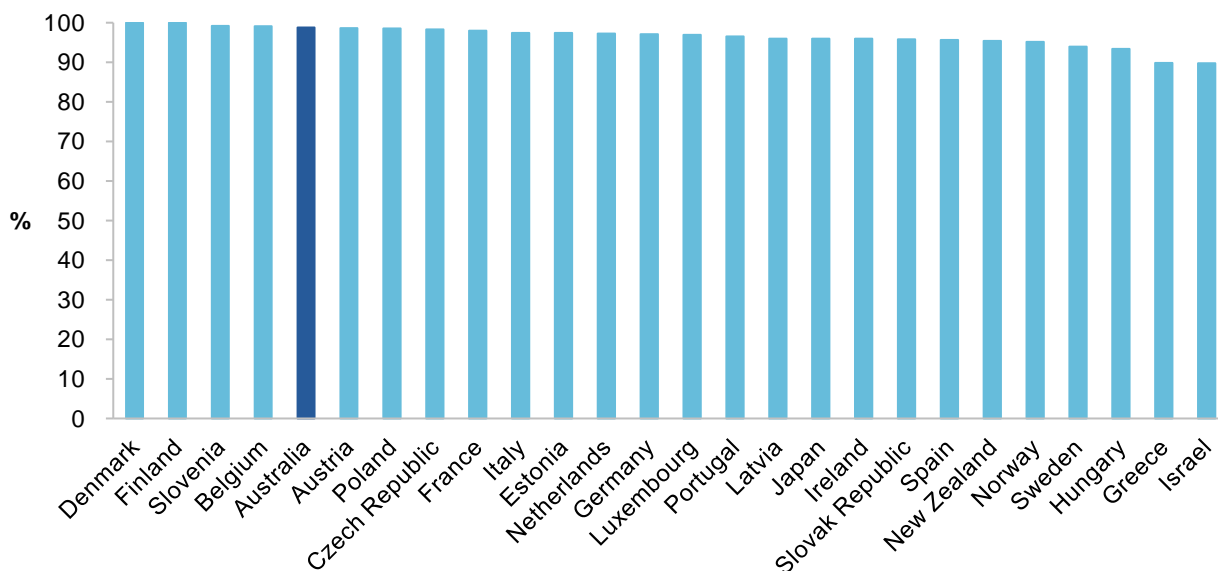
Variation in businesses' adoption of digital and data tools likely reflects differences in expected benefits and costs from adoption. For example, knowledge-intensive industries are more likely to use cyber security software and artificial intelligence, while manufacturing and supply chain logistics industries are more likely to use radio frequency identification and electronic data interchange tools. This could explain variation in the rates of technology diffusion across the economy and may affect dispersion in business performance.

1.2 International comparisons on technology and data use

Australia's internet coverage is high, but speeds are relatively low

Individual and business access to the internet is a useful starting point to understanding how Australia compares to other countries on digital and data use, as internet connectivity underpins most other technologies and their potential productivity benefits. Australian businesses are well connected to the internet relative to other OECD countries, with about 99% of Australian businesses having a broadband connection (either fixed or mobile) in 2020 (figure 1.8).

Figure 1.8 – Almost all Australian businesses have broadband internet connections
Share of businesses with a broadband connection (includes fixed and wireless), 2020



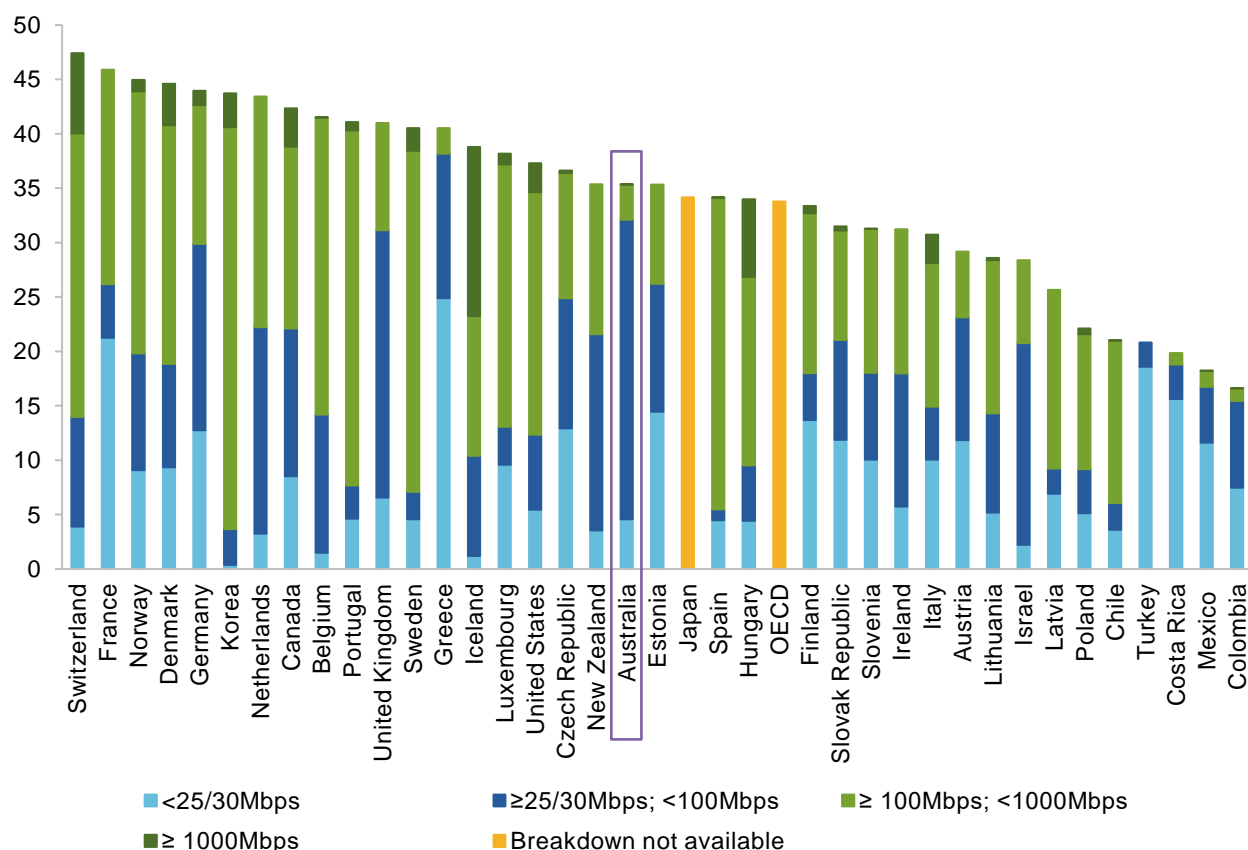
Source: OECD (2022b).

However, Australia's internet speeds are lower than many other OECD countries, particularly for fixed broadband connections. The majority of fixed broadband subscriptions in Australia are between 25/30 megabits per second (Mbps) and 100 Mbps (figure 1.9). Other countries — such as Switzerland, Korea and the United States — have a much higher proportion of fixed broadband subscriptions with speeds of 100 Mbps or higher. Moreover, speed test data shows that Australia's actual internet speeds are not globally

competitive. In the year to January 2022, Speedtest by Ookla reported that Australia's median mobile internet download speed was 68.35 Mbps (ranking 18th in the world) and the median fixed broadband download speed was 50.89 Mbps (ranking 61st) (Ookla Speedtest 2022).⁴

Figure 1.9 – Australia has many middling speed connections

Fixed broadband subscriptions per 100 inhabitants by download speed tiers, June 2021



Source: OECD (2022a).

Australia's large number of 25–100 Mbps subscriptions could reflect digital infrastructure (discussed in section 3.1) and broadband pricing, as many internet users may have a connection that could accommodate a faster subscription but choose to purchase a lower speed plan. Previous research has found that Australia ranks fourth out of 13 OECD countries on broadband affordability (measured using median price as a share of per capita income) for the 26–50 Mbps speed tier, but sixth for the 51–100 Mbps tier — below France, Japan, South Korea, Germany and the United States (Accenture 2021, p. 15). However, the report did not examine pricing and affordability for speeds higher than 100 Mbps.

Whether or not Australia's broadband speeds provide an adequate baseline of connectivity for businesses depends on what businesses need their internet connections for and what emerging technology this enables businesses to adopt, now and in the future. For example, speeds of greater than 100 Mbps increase the

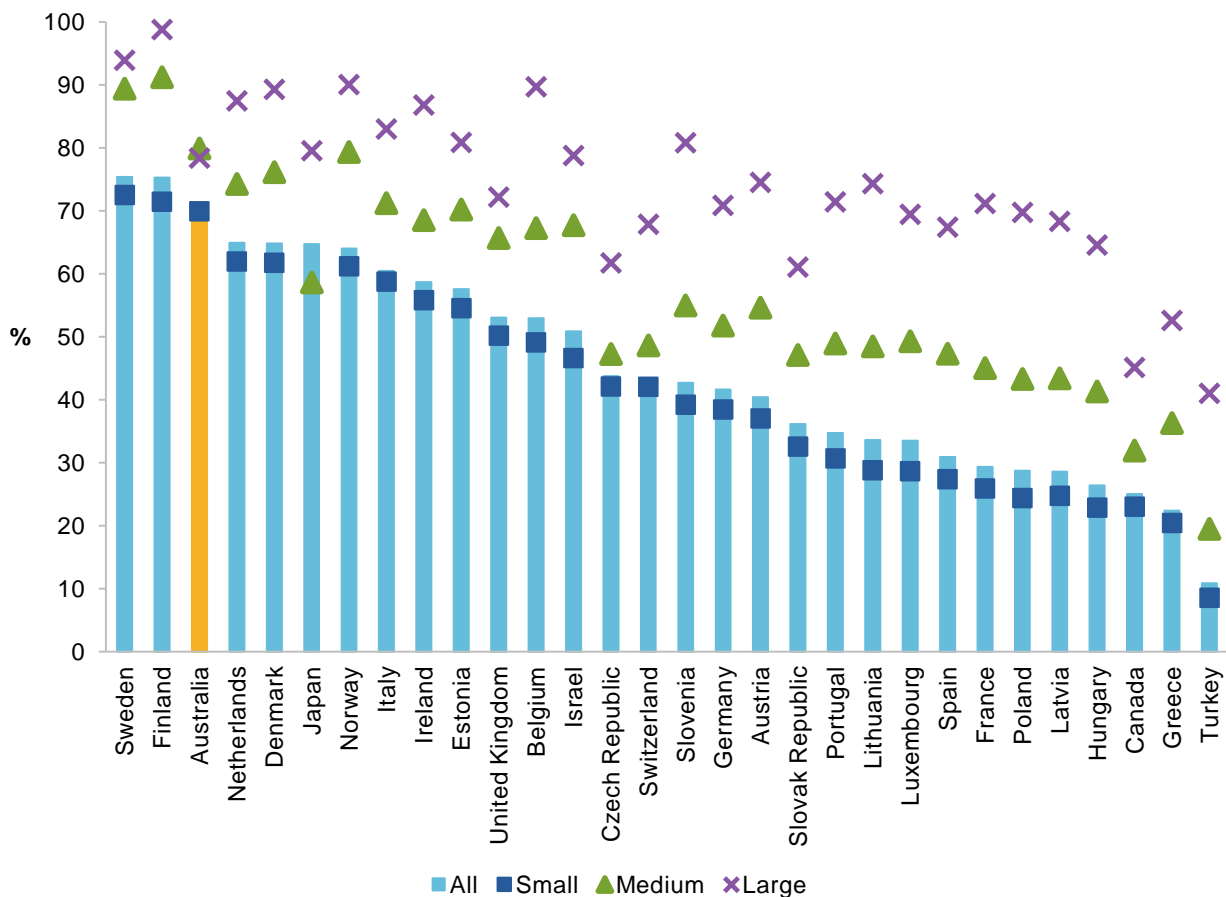
⁴ Speed test rankings from an individual source must be interpreted with caution, because they are based on the selected sample of internet users that perform speed checks with that source (AlphaBeta 2019b). The OECD reports that Australia has consistently low fixed broadband download speeds across several different sources, including Ookla, M-Lab and Steam (OECD 2022a).

capacity of businesses to use cloud services and host multiple servers (Francom 2020), implying that lower speeds may constrain the uptake of these services. Internet speeds will also affect how many devices can be connected to a network (Antonelli 2022), suggesting that uptake of IoT devices may also be curtailed if the average speeds of Australian internet are insufficient.

Notwithstanding these relatively lower speeds — and perhaps in part driven by relatively high internet coverage — Australian businesses have higher rates of cloud technology adoption than many other countries. The share of businesses using cloud technology in Australia is third in the OECD, with 71% of businesses purchasing cloud computing services (figure 1.10). Evidence suggests that Australia's comparatively high uptake of cloud technology has persisted for some time, with earlier research finding that Australia had the second highest per-capita cloud computing expenditure in 2015, at US\$371.50 (second only to Singapore, which had expenditure of US\$539) (Gutierrez, Boukrami and Lumsden 2015).

Figure 1.10 – Australian businesses do relatively well on cloud adoption^{a,b}

Share of businesses purchasing cloud computing services by firm size, 2021



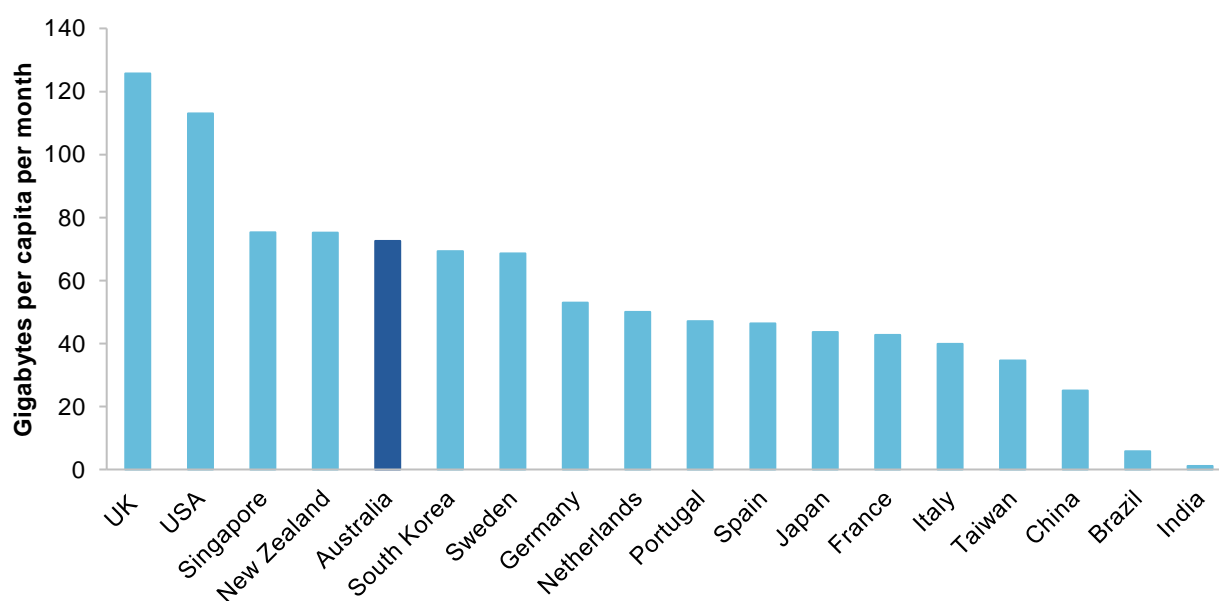
a. Australian data refers to the fiscal year ending 30 June 2020 instead of 2021. b. For Israel and United Kingdom, data refer to 2020 instead of 2021. For Canada, Japan and Switzerland data refer to 2019 instead of 2021. For Japan, data refer to businesses with 100 or more employees instead of 10 or more; medium-sized enterprises have 100-299 employees and large ones 300 or more.

Source: OECD (2022a).

Data consumption is high but use of data-driven technologies is low

The production, sharing, analysis and use of data can significantly improve economic outcomes (as discussed in section 2.2) and Australia performs relatively well as both a data producer and consumer. For example, in 2019 the Harvard Business Review ranked Australia as 9th in the world on a list of ‘new’ data producers, based on our internet use and accessibility scores (Chakravorti, Bhalla and Chaturvedi 2019). Australia is also a comparatively large consumer of data, with per-capita download volumes similar to countries such as Singapore, New Zealand, South Korea and Sweden (figure 1.11).

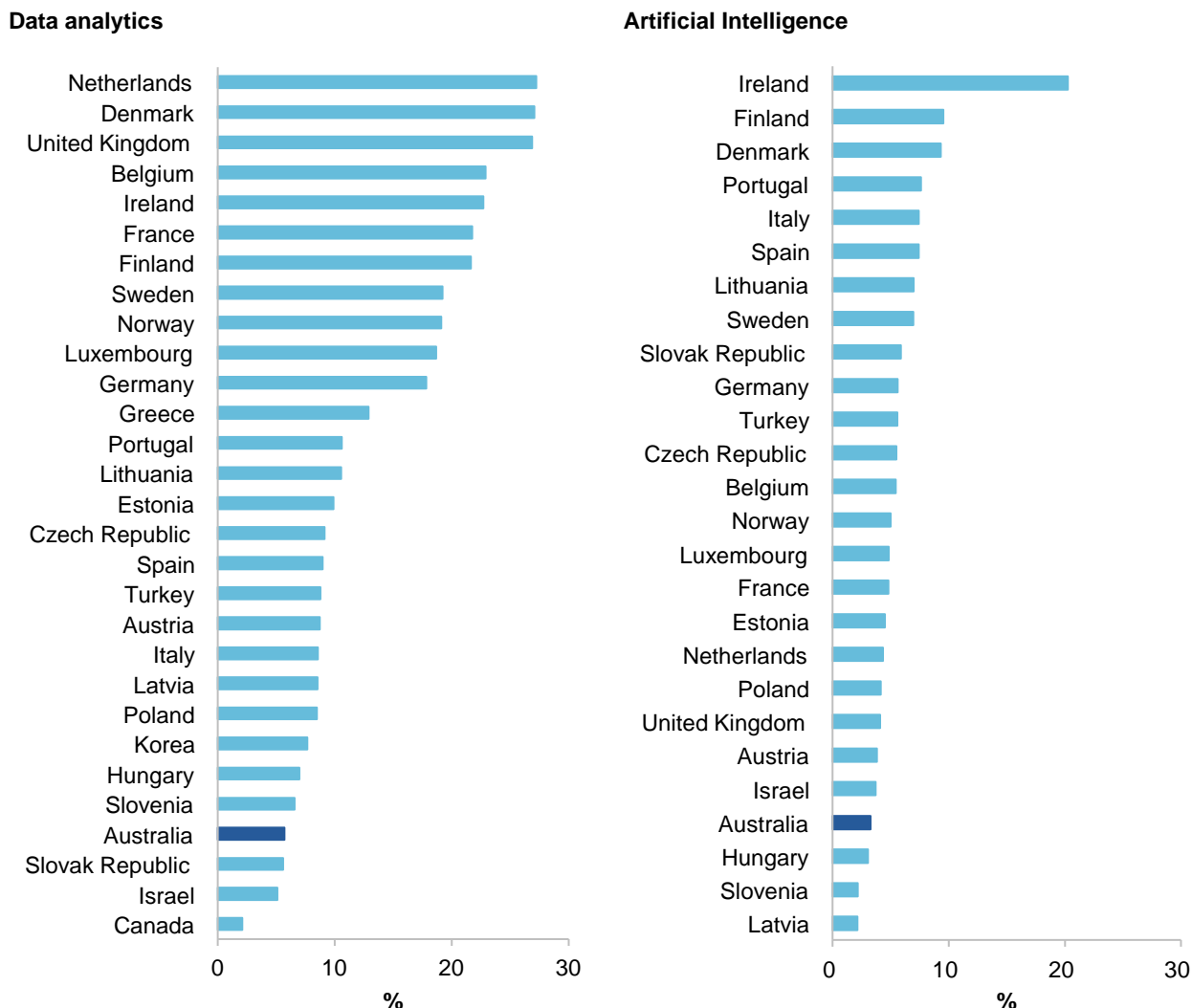
Figure 1.11 – Australia’s data download volumes are relatively high
Fixed broadband data consumption, 2019



Source: Ofcom (2022).

These significant data volumes suggest that Australia has a lot of potential to leverage data-driven technologies, such as AI and data analytics (box 1.1), for productivity gains. However, adoption of these technologies is currently low compared with other countries. Only 6% of Australian businesses were using data analytics (such as working with big data or geospatial technology) in 2019-20 and an even lower share were using AI — in both cases, Australia’s adoption is low compared with other countries in the OECD (figure 1.12). Some other studies have suggested that Australia performs relatively well in AI; for example, Zhang et al. (2021) ranked Australia at 8th in the world in 2020. However, this high ranking is partly due to Australia’s performance in AI research (such as journal citations and publications), which does not necessarily translate to more use of AI by businesses.

Figure 1.12 – Australian businesses are trailing in use of data-driven technologies
Share of businesses who use data analytics, 2019^a, and artificial intelligence, 2020



a. While international data on data analytics use in 2019 has been sourced from the OECD, the share of Australian businesses using data analytics is from the ABS for 2019-20 (figure 1.4). The OECD's statistics do not include Australia in the cross-country comparison on use of data analytics.

Source: ABS (*Characteristics of Australian Business* 2019-20 financial year, cat. No. 8167.0), OECD (2022b, 2022a).



Finding 4.4

Australia trails behind other countries in more advanced uses of technology

Australia performs well compared with other developed economies on foundations such as internet connections and data volumes. But we trail in some more advanced indicators such as internet speeds and use of data-driven technologies.

2. Potential barriers to adopting new technologies and data

Key points

- * **Although many businesses are adopting digital tools to improve their productivity, there are some barriers slowing the adoption of new uses of technology and data across the economy.**
- * **The most common barriers to technology and data adoption identified by Australian businesses are inadequate internet, lack of skills, limited awareness and uncertainty about benefits, cost and legacy systems.**
 - Agriculture businesses are most likely to cite unsuitable internet speed and geographic location as barriers, suggesting poor digital connectivity in regional and remote areas could be limiting adoption.
 - High costs are more frequently identified as a barrier by medium and large businesses, which could reflect the costs associated with transitioning from legacy systems and established processes towards new technologies and ways of working.
- * **More broadly, unique features of the digital and data environment could hinder adoption. For instance, without clear rules about access and rights, data is likely to be underutilised as potential users could be excluded. Businesses are also likely to underinvest in cyber security because the costs of cyber attacks to an individual business are often less than the costs of such attacks to society more broadly.**

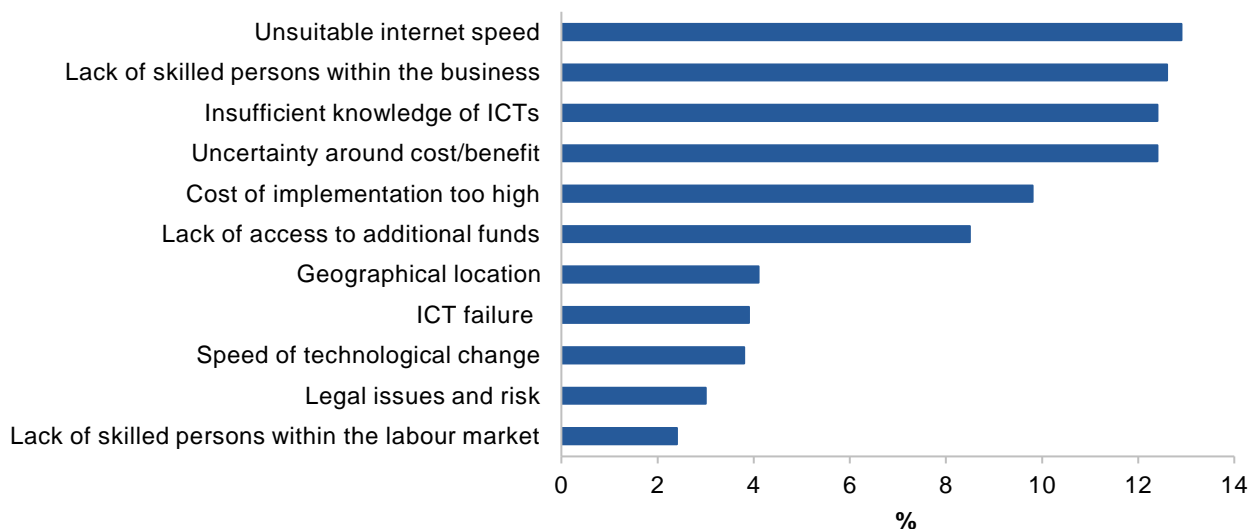
2.1 Business-level barriers to digital and data uptake

In deciding whether to adopt digital technology and new uses of data, Australian businesses weigh up the significant benefits (outlined in section 1.1) against the costs of adoption and barriers that may be preventing uptake. Businesses report that in 2019-20, the top factors that limited their use of technology were inadequate internet speeds, lack of skills and knowledge in the business, and cost or benefit uncertainties (figure 2.1). Various other studies of businesses in Australia and around the world have found similar barriers to adoption.

- Certified Practising Accountants Australia's survey of over 700 businesses in Australia, China, Hong Kong, Macau, Malaysia and Singapore found that the top technology adoption challenges are 'financial constraints', 'shortage of technology talent' and 'complex legacy systems' (CPA Australia 2021, p. 22).
- Deloitte Access Economics' survey of about 500 Australian small businesses reported that the main barrier to digital engagement is costs, followed by issues relating to awareness and decision making (for example, businesses believing that digital and data are not relevant to their business or simply not having thought about their use) (DAE 2019a, p. 11).

- Xero's research on behavioural barriers to adoption surveyed more than 4200 small businesses in Australia, New Zealand, Singapore, the United States, the United Kingdom and Canada, and found the top issues were resistance to change and uncertainty (Xero 2021a, p. 13).

Figure 2.1 – Internet speed and lack of skills are the biggest barriers to adoption
Share of businesses citing each factor as limiting their use of ICTs, 2019-20^a



a. This chart uses weighted estimates as published by the ABS in its *Characteristics of Australian Business 2019-20* publication. Source: ABS (*Characteristics of Australian Business*, 2019-20 financial year, Cat. no. 8167.0).

The specific nature of these barriers varies from business to business. Issues about cost, for instance, could relate to upfront costs of upgrading systems and processes, as well as ongoing costs related to new uses of technology and data. This financial equation is changing as many of these new applications are accessed via software-as-a-service models rather than through on-premise software and servers — TechnologyOne, which provides both types of products, estimates that ‘moving to a SaaS approach can lower IT costs by up to 30%’ (TechnologyOne 2019, p. 3).

However, businesses that are transitioning from legacy systems must also factor in the costs of changing processes and training staff to work with new digital tools. These represent additional sources of cost and uncertainty and can affect businesses of all sizes. Smaller businesses may not have the time or resources to navigate significant change; for example, Xero has observed that Australian small businesses are ‘stuck in a “wait and see” mode with new technology – they’re reasonably excited about its potential, but not so much so that they’ll step into uncharted waters’ (Xero 2021a, p. 26). Meanwhile, larger businesses may have more substantive legacy systems that need to be updated, and implementing significant changes to what could be long-established processes requires large amounts of time and investment (discussed below).

Lack of skills and talent can also manifest as a barrier in different ways across different businesses. In some cases, this relates to the specialist knowledge and capabilities of workers that need to use technology and data in their roles. Research by Gartner has found that talent availability inhibits technology adoption across a range of digital and data domains — including automation, security and digital workplaces — and that skills challenges have become more prominent since 2020 (Gartner 2021). Australian workers’ digital and data-related skills are discussed in further detail in section 3.3.

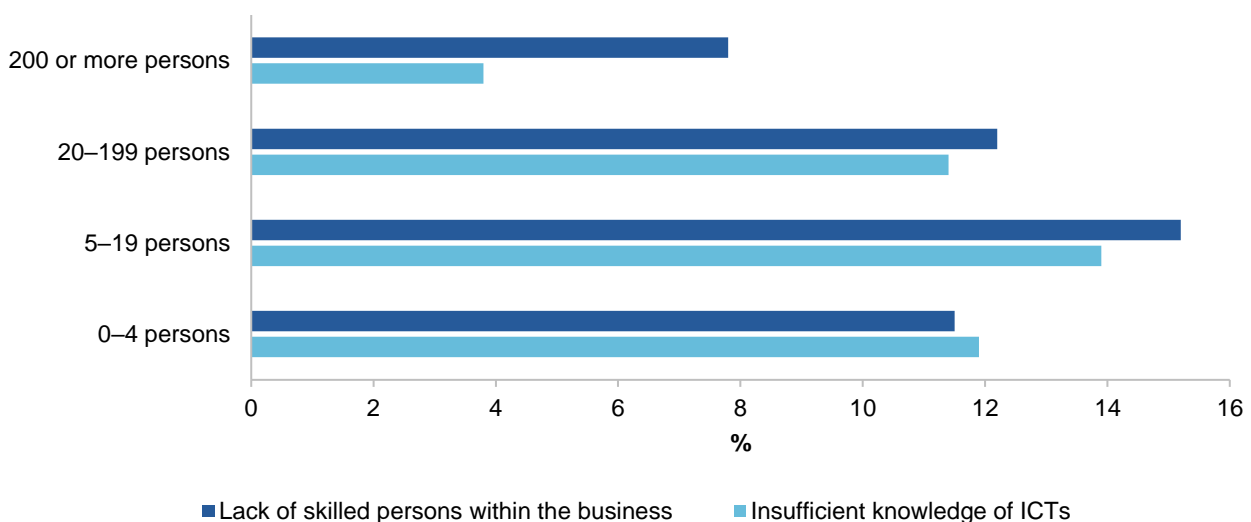
In other cases, adoption of innovative uses of technology and data is hindered by the capabilities of senior leadership. For example, a survey of 1300 executives in businesses from Australia, China, France, Germany, Japan, the United States and the United Kingdom found that 'while 81% of the executives agree that data skills are required to become a senior leader in their companies, 67% say they are not comfortable accessing or using data themselves' (Davenport and Mittal 2020). Limited skills could mean that senior leadership is unaware of the potential benefits of adopting digital and data tools, and as strategic decisions are often made at this senior level, this lack of relevant skills could slow business uptake.

The barriers that Australian businesses face in adopting technology and data vary depending on business characteristics. For example, in 2019-20 (ABS 2021a):

- unsuitable internet speed was a particular problem in the agriculture, forestry and fishing industry — 28% of agriculture businesses identified this as a barrier, almost double the rate of the next-highest industry (retail trade, 16%). In addition, 22% of agriculture businesses stated that geographic location limited their technology use, which was also double that of the next-highest industry (mining, 11%). As agriculture businesses primarily operate in regional and remote Australia, this indicates that internet connectivity and digital infrastructure could be a barrier to productivity-enhancing technology adoption in these locations
- high implementation costs were more likely to be identified as a factor limiting technology uptake by medium businesses (17% of businesses employing 20 to 199 persons) and large businesses (15% of businesses employing 200 or more persons), rather than small businesses. As discussed above, transitioning from legacy systems to new technologies can involve significant costs, and medium and large businesses are more likely to have established processes that are costly to change and therefore present larger barriers to adoption
- the most frequently cited skills barriers — lack of skilled persons in the business and insufficient knowledge of ICTs — were more likely to be identified as limiting factors by small and medium businesses, and particularly businesses employing 5 to 19 persons (figure 2.2).

Figure 2.2 – Small businesses are more likely than micro, medium and large businesses to face skills barriers to adoption

Share of businesses citing skills factors as limiting their use of ICTs by business size, 2019-20^a



a. This chart uses weighted estimates as published by the ABS in its *Characteristics of Australian Business 2019-20* publication. Source: ABS (*Characteristics of Australian Business*, 2019-20 financial year, Cat. no. 8167.0).



Finding 4.5

There are various barriers to business adoption of technology

Australian businesses report challenges to adopting digital and data tools that include: inadequate internet, lack of skills, limited awareness and uncertainty about benefits and costs, and legacy systems. Inadequate internet connectivity and speed are particular issues in the agriculture industry, while skills barriers are more likely to be identified by smaller businesses.

2.2 Broader limitations in the digital and data environment

Beyond the barriers to adoption experienced by individual businesses, there are broader issues that are unique to data and digital use that could limit uptake of productivity-enhancing technologies and processes. These include complexities in how data is created, used and shared; and the potential for underinvestment in cyber security to jeopardise the economic gains from greater use of technology and data.

Excessive exclusions to data use weakens its value

Improving data use benefits the economy through several channels

The near-endless possible uses of data means its potential value can vary between data users and applications, as well as over time. There have been some efforts to quantify the value of existing data based on the costs of producing that data.⁵ Income- and market-based valuation approaches are also sometimes used, though in many cases the income streams attributable to a dataset are not easily identified or predicted, and few market prices are observed for data (Coyle and Manley 2022, pp. 8–9). The OECD observes that ‘access to data alone does not generate value — rather, the value from data is derived in its use and after it has been collected, organised, and acted upon. ...Therefore, the value of data is difficult to quantify, as data that is not valuable today may become so tomorrow’ (Jouanjean et al. 2020, p. 13).

Deriving value from collecting, organising and acting upon data creates opportunities for productivity gains. The Commission’s 2017 *Data Availability and Use* inquiry detailed the breadth of potential benefits associated with more access and use of data, as they relate to individuals, businesses and society (PC 2017a, ch. 2). The channels that are most relevant for enhancing productivity include:

- more competition — data allows consumers to make better comparisons on the price and quality of different goods and services, particularly for complex products such as in financial services or healthcare. This enables consumers to make more informed decisions about the products they purchase, providing greater impetus for businesses (and governments) to compete either on price or product features

⁵ For example, Statistics Canada has estimated the value of data based on ‘the labour costs incurred in their production plus associated non-direct labour and other costs, such as the costs of the associated human resource management and financial control, electricity, building maintenance and telecommunications services’ (Statistics Canada 2019). The ABS has applied this sum-of-costs approach to Australia, finding that ‘valuing data as an asset within the national accounts may increase GDP in the order of 2% and would have little impact on the value of capital stock (dependent on the asset life chosen)’ (Smedes, Nguyen and Tenburren 2022, p. 10).

- fuelling innovation — businesses and governments can use data as the basis for new goods and services or incremental improvements to existing ones, as it furthers their understanding of what does and does not work. The data may also be a direct input to the new or improved product, such as when the product relies on an algorithm for part of its decision making
- improving allocative efficiency — data enables resources to be allocated more efficiently by both the private and public sectors. At a micro level, individual inputs (such as energy or worker time) can be monitored and shifted to higher-value uses as required. From a macro perspective, data can be used to identify parts of a system (such as the hospital system) that are over or under capacity, and resources can then be directed accordingly
- targeting government interventions — data can enable governments to better target their interventions in the economy to achieve social and community outcomes, such as public health and safety, income support for people in hardship or environmental improvements.

While these economic opportunities relate to data itself regardless of whether or not the data is digitised, in practice many benefits are realised at scale when digital technologies are used to collect and analyse data, due to the significant lowering of transaction costs (section 1.1).

The ability for data to be used for productivity gains can vary over time. For example, in some cases the value that can be created from using data to improve a product diminishes as more data is collected and analysed — the information contained in the purchases of the first 1000 customers is likely to be more useful than data from the 1 000 001st to 1 001 000th customers a year later. Data can also become obsolete over time; for instance, data from a couple of months ago has lower value for informing resource allocation now, compared with making similar decisions at the time the data was collected. Alternatively, new digital technologies may open up value from previously underutilised datasets.

Moreover, the economic benefits associated with the above opportunities sometimes stem from interdependencies in how data is valued and used by different stakeholders. For example, a consumer gets value from data on their previous purchase decisions because it can help to inform their preferences when buying related goods and services in the future. Because of this, businesses selling similar products can make use of this preference data to improve their offerings and therefore their competitiveness relative to other sellers. These interdependencies mean that maximising the productivity gains associated with using data may require data linkage between multiple sources or stakeholders, as well as analytic capabilities to extract useful insights (OECD 2015, p. 186).

Making data available in private and public contexts

Given the potential economic benefits, making data widely available for businesses and governments to use could generate significant productivity gains. However, as discussed in section 1.1, external parties can be excluded from accessing and using data, even though its use in the production process is non-rivalrous. While this excludability provides a mechanism for incentivising data production and collection, it also prevents others from using the data to create new economic value. In this context, restrictions placed on data access are conceptually similar to intellectual property, where there is also a trade-off between broader access to something and its exclusive use, with this balance often struck by granting content creators

exclusive intellectual property rights for a limited time.⁶ However, such time-based, temporary rights over data generally have not been developed in Australia or elsewhere.

A private business that controls data may find it profit maximising to exclude other parties from that data. For example, it has been claimed that control of customer data enables digital platforms to create barriers to entry by rival businesses and to limit competition, particularly in search and advertising technology services (ACCC 2022d, pp. 166–167). Nonetheless, private organisations may share data on their own accord if there are mutual benefits and regulatory requirements such as privacy laws and commercial contract conditions are adhered to. Research by the European Commission noted that where there are gains for multiple private parties, even if there is no overarching framework requiring data sharing, 'bargaining in data markets produces a de facto ownership or residual rights allocation, both in commercial [business-to-business] and in personal [business-to-consumer] data settings' (Duch-Brown, Martens and Mueller-Langer 2017, p. 46). For example, advanced manufacturing businesses have generated efficiency improvements through private agreements to share real-time engineering data with their suppliers, which enables faster product design, more flexible operations and better cost management (ODI 2020, p. 2).

But as the non-rivalrous nature of data means that it can be very widely used across the economy, it is likely that these private market-based solutions would not result in a socially optimal allocation of data. The OECD has observed that 'greater social value is created with greater use of common resources [as] in the case of non-rivalrous goods such as data. This is the strongest rationale for policy makers to promote access to data' (OECD 2015, p. 38). There are various mechanisms that governments can use to reduce the capacity of private entities to undesirably exclude others from accessing data, such as by implementing a framework that establishes rights over data and requires that data is shared if requested by someone with a right over it. An example of this is Australia's Consumer Data Right, discussed in further detail in section 3.2.

Because excludability sometimes provides the incentive for private organisations to invest in collecting, cleaning and storing data for their own uses (section 1.1), government requirements compelling these organisations to share their data could erode some of the private economic benefits that they realise from their investment and/or reduce the quality of data available. In some cases, individuals may be less accepting of making their data available to a private organisation if they know that the organisation is compelled, in turn, to share that data with a third party. Efforts to increase data sharing to enable more or higher value uses of non-rivalrous data must therefore be balanced against the risks of disincentivising future data production (as well as taking into consideration privacy and data security concerns). Governments also face challenges in specifying the optimal level of access 'because it is difficult to know ex-ante what the social welfare maximizing arrangement would be, [so] regulators may have little guidance for an intervention' (Duch-Brown, Martens and Mueller-Langer 2017, p. 47).

The socially optimal amount of data availability varies based on the private or public nature of the benefits and costs associated with its use. It can also depend on whether private or public sector entities are involved in collecting and holding the data. Data can be produced purely by the public sector, purely by the private sector or somewhere in between these two ends of the spectrum (for example, jointly produced by public and private entities or collected and held by private businesses but funded by government). The role of government varies in these scenarios — section 3.2 explores different ways that government can support data sharing and use in different contexts.

⁶ The Commission previously examined intellectual property rights in its 2016 *Intellectual Property Arrangements* inquiry. In highlighting the trade-off between production and use, the inquiry stated that intellectual property rights should aim to provide 'appropriate incentives for innovation, investment and the production of creative works while ensuring it does not unreasonably impede further innovation, competition, investment and access to goods and services' (PC 2016, p. 6).



Finding 4.6

Data sharing enables productivity growth but can reduce incentives to invest in data

More access to and better use of data enables productivity growth by increasing competition, innovation and allocative efficiency. But efforts to increase data sharing could discourage quality future data production if they erode the economic benefits that private organisations can realise from investing in data collection and analysis. As such, increased data access must be balanced alongside incentives for the ongoing collection and maintenance of quality data, as well as privacy and data security concerns.

Businesses are likely to be underinvesting in cyber security

Poor cyber security jeopardises economic gains

As the use of technologies and data has spread throughout the Australian economy, so too have the risks that attacks on the digital systems and networks that underpin these activities can directly affect economic prosperity. There are multiple sources of risks and points of vulnerability; for example, unprotected software and hardware and human error.

The number of cyber crime incidents is growing in Australia, with cyber crime reports to the Australian Cyber Security Centre (ACSC) increasing to 76 000 incidents in 2021-22, up 13% on the previous financial year (ACSC 2022a, p. 11). In 2021-22, the most common type of cyber crime reported was fraud, representing 27% of all reports (figure 2.3), while many of the shopping and online banking incidents were scams involving loss of finances or personal information. Online scams not only harm consumers but can significantly reduce businesses' confidence in digitising or adopting new technologies, with the ACCC observing that it can be very difficult to repair the damage inflicted by scams after they have occurred (ACCC 2021e, p. 2). About 450 ransomware attacks were reported in 2021-22; while low in number, the ACSC noted that it is likely ransomware is significantly underreported, 'especially by victims who choose to pay a ransom' (ACSC 2022a, p. 47).

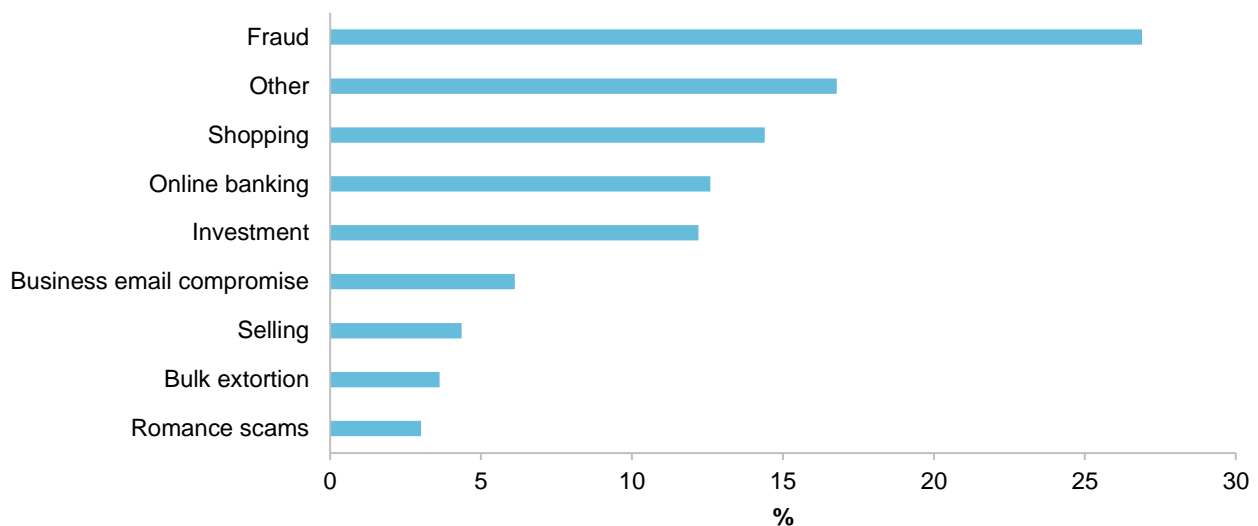
Most cyber security incidents are self reported in Australia, so the true magnitude of cyber crime is unknown. However, international analysis on the extent of cyber breaches undertaken by global cyber security software providers indicates that Australian businesses receive a large share of cyber attacks. For example, Australia was the third-most targeted country based on ransomware intrusion volumes in 2021, behind the United States and Italy (Accenture 2022, p. 5), and a 2020 survey found that Australia had the highest percentage of firms reporting a ransomware attack in the previous 12 months (CyberEdge 2021, p. 23).

Cyber security is an important pre-condition for effective use of digital technology and data, and poor security practices can limit productivity and economic gains in several ways.⁷ First, concerns about security risks can prevent uptake of digital tools and data analysis. For instance, concerns about security and lack of trust in service providers are a barrier to cloud adoption (Alismailli et al. 2020), with 10% of Australian businesses citing security concerns as a reason for not adopting cloud technology (ABS 2021a). Conversely, providing

⁷ The Australian Government differentiates between cyber security — which involves 'protecting data, information, devices and networks from malicious actors' — and online safety, or protection from 'harmful content and behaviours such as cyber bullying, image-based abuse and illegal and harmful online content' (Home Affairs 2020a, p. 35). This report focuses on cyber security rather than online safety, as it is the main factor that could affect productivity.

assurance and confidence in digital and data systems and processes, and minimising the risks involved, can support adoption.⁸

Figure 2.3 – Fraud is the most common cyber crime reported in Australia
Cyber crime reports made to the ACSC by crime type, 2021-22^a



a. The 'other' category includes crimes such as harassment and malware.

Source: ACSC (2022a, p. 23).

Second, cyber security incidents can also have significant economic consequences in terms of lost output or productivity. In Australia, the ACSC stated that self-reported losses from cyber crime totalled more than A\$33 billion in 2020-21 (ACSC 2021a, p. 17) and worldwide, the Centre for Strategic and International Studies estimated that in 2020 the cost of cyber crime to the global economy was US\$945 billion (Smith, Lostri and Lewis 2020, p. 3). The impact on an individual business can be significant; for example:

- the average cost of a data breach to Australian businesses was estimated to be US\$2.8 million in 2021, when taking into account the direct and indirect costs of 'detection and escalation, notification, post breach response and lost business' (IBM 2021, p. 9)
- 60% of all targeted cyber attacks strike small and medium businesses, and the average time to resolve an attack is 23 days — though this more than doubles to 51 days if the attack stemmed from a malicious insider, employee or contractor (Australian Government 2015)
- two-thirds of small and medium businesses would have to shut down for at least a day, and potentially go out of business, if they were hit with a data breach (Forrest 2017).

While security expenditure is increasing, not all risks and costs are considered

Australians are already increasingly investing in cyber security to protect themselves from the costs of cyber attacks and breaches. AustCyber estimates that Australia's total cyber security expenditure was \$5.6 billion in 2020, having increased at an average annual rate of 9% between 2017 and 2020 (AustCyber 2020, p. 8). Providers of cyber security products and services earn about 30% of their revenue from sales to government customers (including in the healthcare, social care, education and defence sectors) and up to 25% from financial

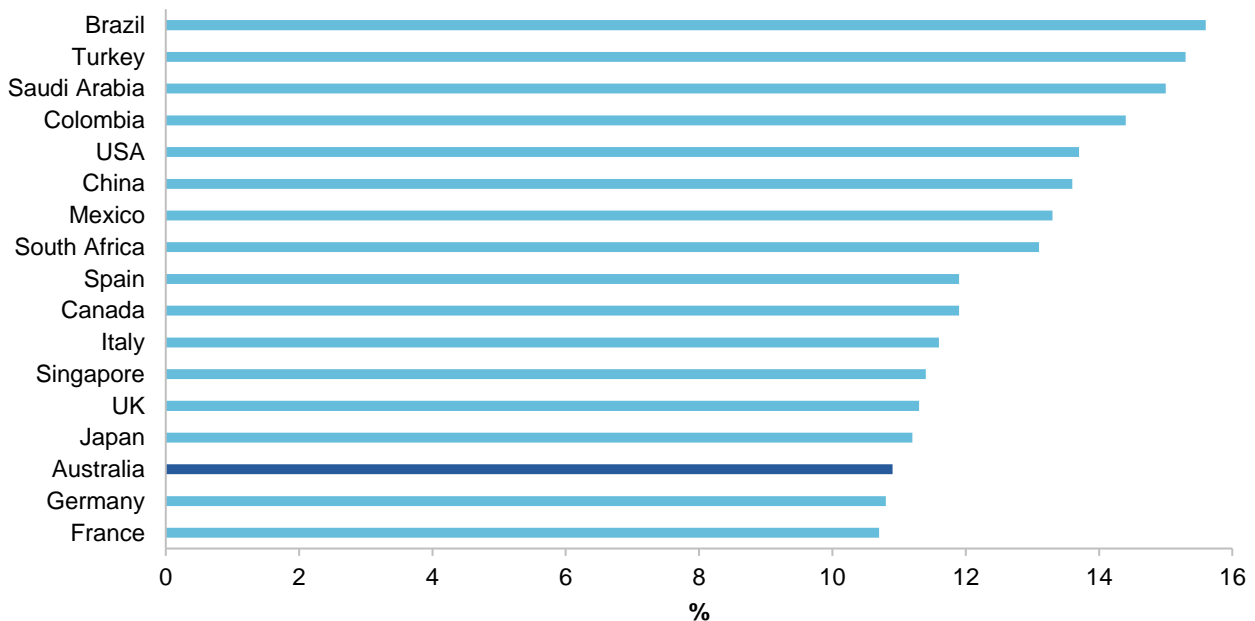
⁸ But there is also often a trade-off between security of data and access to (and hence efficient use of) data, implying that there is an optimal level of insecurity (Moore 2010, p. 106).

services customers (AustCyber 2020, p. 19). However, this only reflects expenditure on external cyber security products and services — businesses in some sectors, such as technology and financial services, are reportedly building internal cyber capabilities rather than purchasing from external providers (AustCyber 2020, p. 19).

International estimates suggest that Australian businesses have a comparatively low share of IT expenditure dedicated towards cyber security — about 11% in 2021 (figure 2.4), down from 13% in 2020 (CyberEdge 2021, p. 29). Moreover, expenditure on cyber security in itself is not sufficient to mitigate risks, as companies also need to ensure that their security products are integrated into broader business practices, capabilities and culture (Braue 2022).

Figure 2.4 –Australian businesses’ IT expenditure allocated to cyber security is comparatively low

Share of businesses’ IT budgets allocated to cyber security, 2021



Source: CyberEdge (2022, p. 32).

As many of the benefits from using digital technologies stem from greater connectivity between stakeholders and systems, the costs of a security incident affecting one person or business can have negative consequences for a much larger group. This negative externality can have significant consequences: ‘information systems are prone to fail when the person or firm responsible for protecting the system is not the one who suffers when it fails. Unfortunately, in many circumstances online risks are allocated poorly’ (Moore 2010, p. 105). For example, the total cost of a security breach to a business that collects and holds customer data electronically is higher than the cost incurred by the business itself, as all of that business’s customers would be affected and the negative impacts could also extend to compromising confidence in other businesses in similar industries. The business would underinvest in cyber security if it fails to internalise these wider costs.

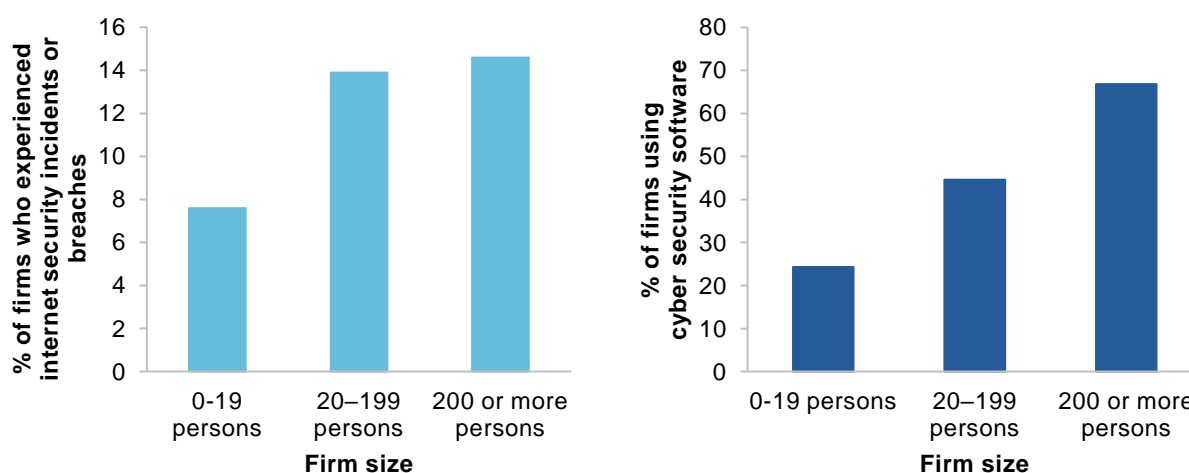
This issue is compounded by interdependencies in the use of digital and data tools, and information asymmetries when the users of these tools are relatively uninformed about potential security risks. Cyber criminals can exploit links between computer networks and systems to attack a wide range of users — for example, by targeting digital services providers to spread malware through software updates issued to their customers, as in 2017’s NotPetya attack and 2021’s SolarWinds attack (Huang, Pearson and Madnick 2021). But it can be challenging to ascertain the extent of cyber security risks: individuals and

businesses may have difficulty verifying a software vendor's security performance, making them reluctant to incur additional costs for increased security with uncertain benefits (Kox and Straathof 2014, pp. 2–3). And where the reporting of security incidents is voluntary, most stakeholders have an incentive to underreport cyber attacks to avoid drawing attention to vulnerabilities and reduce reputational risks.

Businesses of different sizes have different experiences with cyber security risks and investments. The ABS's Business Characteristics Survey reported that in 2019-20, smaller businesses were comparatively less likely to experience (or at least report) a cyber breach or incident, whereas medium and large businesses were almost twice as likely to report that they were attacked (figure 2.5, left chart). While large businesses were correspondingly more likely to be using cyber security software (reported by two-thirds of large businesses), a smaller share of medium-sized firms (45%) used security software (figure 2.5, right chart), in spite of being almost as likely to experience an attack.

Figure 2.5 – Cyber threat and security levels vary by business size

Share of businesses experiencing incidents and using security software by business size, 2019-20^a



a. This chart uses weighted estimates as published by the ABS in its *Characteristics of Australian Business 2019-20* publication. Source: ABS (*Characteristics of Australian Business*, 2019-20 financial year, Cat. no. 8167.0).

Other studies have also found that small and medium enterprises (SMEs) have less mature cyber security practices, attributable to issues such as ad-hoc cyber budgets, poor preparation for incident response and a lack of understanding of technical security terms (Andal et al. 2022; Cynch Security et al. 2021). According to the Australian Chamber of Commerce and Industry, 'it is becoming increasingly important for SMEs in particular to look to the adoption and successful implementation of digital technologies within a trusted ecosystem, secured by design that is both robust and resilient' (ACCI, sub. 47, p. 25).

The negative externalities and information asymmetries associated with cyber risks and incidents provide the rationale for government policy on technology and data security, particularly in parts of the system that have many connections to other individuals and businesses, given the interdependencies described above. This is discussed in further detail in section 3.4.



Finding 4.7

Businesses can underinvest in cyber security protections

Cyber security attacks are costly to respond to and recover from, and security concerns can deter uptake of digital and data tools. Businesses that do not account for all of these costs to themselves and others are likely to underinvest in their cyber security. Small and medium businesses are less likely to have mature cyber security practices than large businesses.

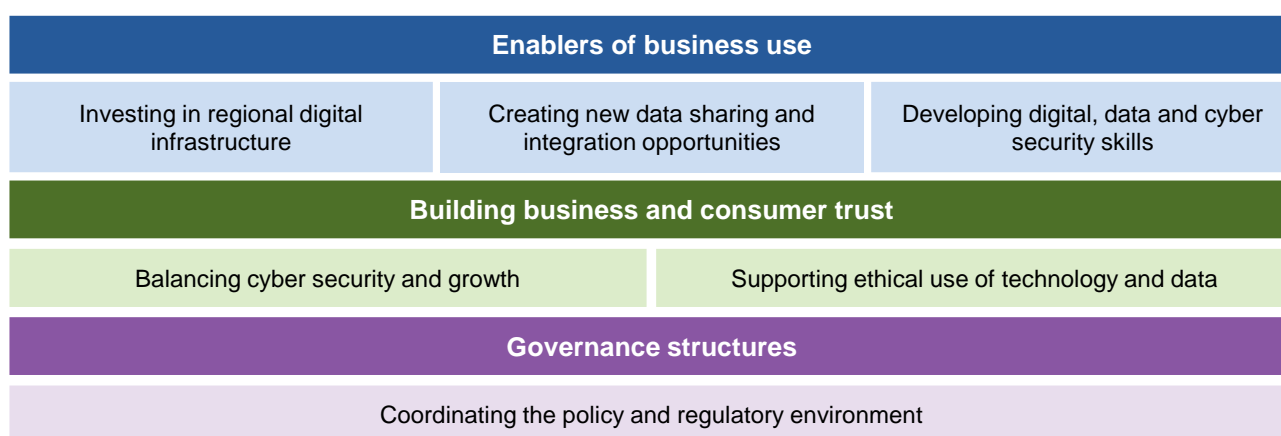
3. Targeting government investments and policy priorities

Key points

- * Technology change and increasing private sector provision of digital infrastructure have led to more options for regional and remote Australians to connect to the internet. Infrastructure funding arrangements that currently involve government decisions about technology type and location could be made more competitive and transparent. Competitive tendering could be a more efficient way to deliver the government's Universal Service Guarantee, subject to market feasibility.
- * Data collected by providers of government-funded services is often not shared. More data sharing and interoperability in sectors such as health, education, aged care and childcare would improve services for consumers and system-level policy decisions. My Health Record could provide the foundation for this in the health sector with some further government efforts around data sharing obligations, software compatibility, security and de-identification. More broadly, the government can also facilitate more data sharing and use by extending the *Data Availability and Transparency Act 2022 (Cth)* to allow government data sharing with the private sector, and expanding access to the Digital Identity.
- * Meeting Australia's digital and data skills needs is an important enabler of future productivity growth. Industry certifications and short courses provide upskilling and reskilling options for workers to develop digital and data capabilities. Migration policy could better reflect employer demand for emerging skills.
- * Secure use of technology and data is essential for maintaining business and consumer trust, and ensuring lack of trust does not become a barrier to adoption. More information is required to understand whether the government's regulation of high-risk critical infrastructure sectors has led to unintended economic consequences, such as higher costs or lower investment. Streamlining cyber security incident reporting via a single interface would reduce the administrative burden on businesses.
- * Ethical use of technology and data — particularly via artificial intelligence — is an emerging focus area that is also required to build trust. While there is broad agreement on good ethical principles, translating these into action is challenging, and more information is required to determine whether government has a role to play. Regulation (such as privacy regulation) should be targeted to high-risk areas and balance legal and economic concerns to not unduly inhibit productivity growth.
- * More coordination between digital, data and cyber security policy and regulatory agencies, and more engagement between agencies and industry, would reduce overlap and inconsistency and lower uncertainty for businesses.

Government investments and policies provide the foundations that enable businesses to harness emerging digital technologies and uses of data, including by setting appropriate incentive frameworks and access rights, and addressing gaps where market provision is insufficient. The government can also support by building trust in these technologies and data uses among both businesses and consumers. Underpinning these initiatives, adaptable and coordinated governance structures are required to maximise the potential uses of digital technology and data, and minimise duplication and unnecessary burdens. This chapter explores six areas where the government could act to improve these foundations and support digital, data and cyber security activity in the Australian economy (figure 3.1).

Figure 3.1 – Potential areas for governments to improve Australia's digital, data and cyber security foundations



The Australian Government has already implemented a range of investments, policies and strategies relating to digital, data and cyber security. These are brought together in an overarching framework in the government's *Digital Economy Strategy 2030*, which seeks to establish Australia as a leading digital economy and society by 2030. The strategy has three pillars: 'building the foundations to grow the digital economy', 'building capability in emerging technologies' and 'setting Digital Growth Priorities to lift our ambition' (PMC 2021c, p. 3).

Given the significant government activity that is already underway in this space, the Commission has focused its discussion and policy recommendations in this chapter to areas where further action would be beneficial. Existing government initiatives are summarised, where relevant, as context to the analysis.

3.1 Investing in regional digital infrastructure

Ensuring that digital infrastructure, such as broadband and mobile networks, is fit for purpose is vital to underpin continued economic growth as technology advances. Australian businesses need this infrastructure to make best use of productivity-enhancing digital and data tools, and individuals require reliable connectivity to participate in work and society — including accessing essential services such as health, education and welfare support — in an increasingly digitised world. This is reflected in the government's Universal Service Guarantee for broadband connectivity, discussed in more detail later in this section.

Australia's population and economic activity is geographically dispersed across its large land mass. While much of it is clustered around capital cities, regional Australia accounts for about 40% of national economic output and employs about one third of Australia's workforce (RAI 2016, p. 4). More recently, the Commission observed that there has been some population movement from Australia's cities to regional areas since the

COVID-19 pandemic led to increased working from home. Although the number of people moving was small as a share of city populations, because regional areas have much smaller populations, the effects on local economies are likely to be more substantial. A population shift towards regional areas would increase demand for housing and infrastructure, such as telecommunications (PC 2021c, p. 71).

Adequate digital infrastructure is therefore required in both metropolitan areas and regional and remote Australia. But low-quality connectivity outside of Australia's cities is an ongoing issue (Internet Australia 2021). The Australian Government's 2021 *Regional Telecommunications Review* referred to the 'patchwork quilt' of connectivity in regional areas and noted that 'local councils and other regional stakeholders are increasingly expected to facilitate telecommunications service delivery, but are not appropriately resourced to identify connectivity needs and support the deployment of suitable solutions' (RTIR Committee 2021, p. 4). The Australian Local Government Association has noted that 'some regional and remote areas still lack access to reliable connectivity and pay a higher cost for services compared with their metropolitan counterparts' (ALGA, sub. 61, p. 5). Moreover, the Australian Digital Inclusion Index, which has run since 2014, shows an enduring disparity in internet access and speeds between regional and metropolitan areas (Thomas et al. 2021).

Infrastructure Australia reports that 23 of Australia's 48 regions have broadband and mobile connectivity infrastructure gaps under the Regional Infrastructure Gap Prioritisation Framework (figure 3.2). These are areas where broadband and mobile infrastructure 'does not ensure user, business and industry needs are met. The impacts of this gap are wide-ranging, with some remote communities suffering from social exclusion as a result of limited or non-existent telecommunications infrastructure' (IA 2022b, p. 41). For example, in the remote NSW town of Wilcannia, most residents access the internet through mobile connections but coverage 'is patchy and unreliable, congested in peak periods and has low penetration inside buildings... This is further exacerbated by Wilcannia's remoteness' (Featherstone, Ormond-Parker and Holcombe-James 2022, p. 6). As a result, residents have difficulties accessing services such as home schooling, entertainment streaming, telehealth consultations, online banking and work-related video calls. Better connectivity also enables essential services in remote communities to be linked together at lower cost — for example, by connecting schools, healthcare providers (including Aboriginal Community Controlled Health Organisations) and employment support (such as Centrelink services) so that they can deliver higher-quality services to local residents.

Improving regional digital infrastructure could lead to significant economic benefits and productivity gains. For instance, as discussed in section 2.1, unsuitable internet speeds and geographic location were particular barriers to technology adoption among agriculture, forestry and fishing businesses — which typically operate in regional and remote Australia. The Bureau of Communications, Arts and Regional Research estimated that:

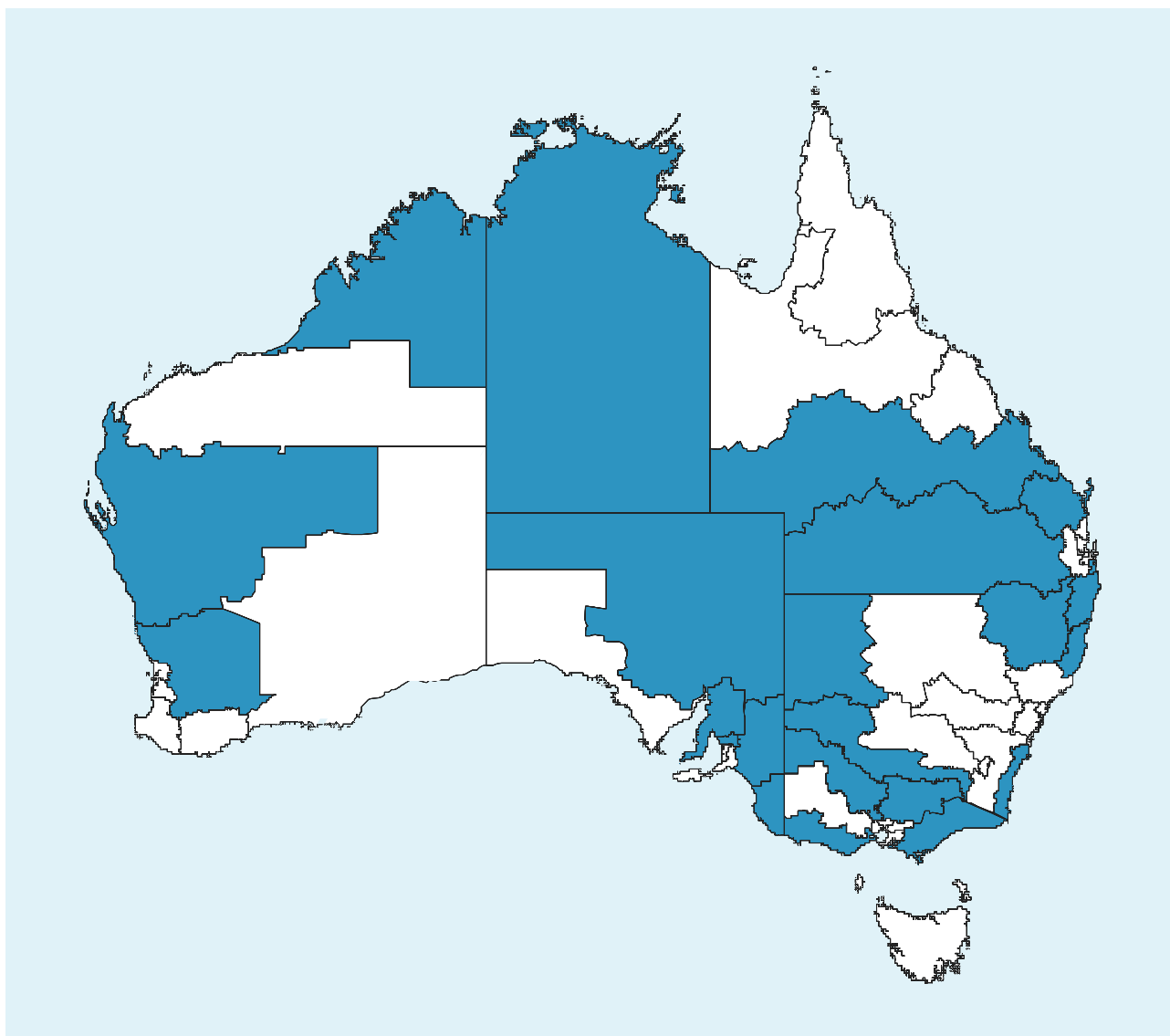
... the additional economic benefit from broadband-supported technology could be between \$3.0 and \$10.6 billion per year (in 2017–18 dollars) for the agricultural sector by 2029–30, which represents an additional boost to economic activity in agriculture of between 4.7 to 16.9 per cent by 2030. (BCARR 2021, p. 5)

This includes through applications such as whole of farm connectivity solutions for crop and livestock production, which covers large areas, and using sensors to improve the allocation of water and other resources. Stylised whole-of-economy modelling undertaken by the Commission for this inquiry found that potential productivity improvements arising from improved regional digital infrastructure (leading to increased technology uptake in the agriculture and mining industries) would lead to increased real GDP, gross national income and wages (appendix B). Moreover, in addition to the social inclusion benefits discussed above, better access to digitally enabled health and education services in regional and remote areas could also

have economic dividends, such as increased workforce productivity and more efficient government expenditure on service delivery in these locations.

Regional digital infrastructure investment can be undertaken by both governments and private entities. The role for publicly funded investments should be limited to areas where the private sector is unwilling or unable to invest, so that governments avoid crowding out private sector investments that would otherwise have occurred.

Figure 3.2 – Almost half of Australia's regions have digital infrastructure gaps
Regions with broadband and mobile connectivity infrastructure gaps, 2022^a



a. Blue shaded areas represent regions that Infrastructure Australia has identified as having broadband and mobile connectivity infrastructure gaps, defined as areas where the available infrastructure 'does not ensure user, business and industry needs are met. The impacts of this gap are wide-ranging, with some remote communities suffering from social exclusion as a result of limited or non-existent telecommunications infrastructure' (IA 2022b, p. 41).

Source: Infrastructure Australia (2022b, 2022c).



Finding 4.8

Inadequate internet in regional areas limits productivity gains and lowers social inclusion

Some regional and remote communities have poor internet connectivity, which can limit the ability of local industries to adopt productivity-enhancing technologies and reduce employment opportunities for local residents (if they are unable to work from home). Inadequate and unreliable connectivity also contributes to social exclusion, as residents are less able to access essential services (such as health, education and welfare support) in an increasingly digitised world.

The diverse technology and sectoral mix of investment

The evolution of digital infrastructure means that there are various ways that businesses and individuals can connect to the internet.

- Fixed broadband involves broadband services being delivered to a fixed location, and includes fixed line connections and fixed wireless connections. Fixed line involves running physical cable to a location. NBN services have a number of different fixed line connection types (such as fibre to the premises and fibre to the node), which have different ratios of fibre optic cable to copper cable, with more fibre being more expensive but resulting in a better connection. Fixed wireless connections use wireless receivers to connect a particular location, rather than using the mobile network.
- Mobile broadband connects users to the internet over the mobile network, requiring mobile base stations in the vicinity and access to radio frequency spectrum⁹ to provide the network.
- Satellite technology connects the user via a satellite network, which has historically been a more expensive option than fixed and mobile services.

Different types of connections will be more or less appropriate depending on the location because of the infrastructure required. Fixed broadband services typically provide reliable internet, but the need for a physical connection and the lack of geographic flexibility mean that for some locations, mobile broadband will be more suitable. However, the reliance of mobile services on base stations can lead to intermittent internet service in mobile black spots. While satellite connections have been used primarily by very remote consumers, cost reductions with technology improvements and increased demand for business and household connectivity have increased satellite connections in less remote parts of Australia (primarily southern New South Wales and Victoria) over the past year (Fogg 2022).

The suitability of all connection types can change over time as technology progresses. For example, much of Australians' internet usage currently occurs through fixed broadband, but other types of connections may become more prominent in the future. The Bureau of Communications and Arts Research (now the Bureau of Communications, Arts and Regional Research) has observed that 'the bulk of data downloaded is through

⁹ The Australian Government (specifically, the Minister for Communications) provides high-level policy guidance on Australia's spectrum resources, with the Australian Communications and Media Authority having day-to-day management responsibilities such as implementing spectrum allocations. These respective roles were clarified in 2021 reforms to the *Radiocommunications Act 1992* (Cth) (DITRDC 2022c). The current spectrum allocation system for mobile broadband purposes does not appear to be a barrier to productivity-improving uses of technology and data. As the use of mobile internet continues to increase, particularly as 5G enables more widespread economic applications, it will be important that the allocation system continues to support the highest value uses of spectrum assets. This could require an examination of how spectrum is allocated to other uses, such as for television broadcasting or government purposes (for example, defence).

fixed networks [although] recent trends highlight that mobile data downloads are growing faster than fixed downloads' (BoCAR 2020, p. 74). In this context, the ACCC has recently stated that:

5G mobile and fixed wireless services could become a substitute for fixed line broadband services [and] in some areas are becoming increasingly attractive to consumers as an alternative to fixed line services. However, the technology currently has a limited geographic footprint and it is not clear whether it could service the majority of fixed line broadband end-users. (ACCC 2021d, p. 12)

As such, investing in a mix of technology types to improve regional and remote connectivity is most efficient, as different connection methods can be used and adapted to more efficiently accommodate the needs of various locations. The Commission has previously advocated for a technology-neutral approach to government policy on connectivity in its 2017 *Telecommunications Universal Service Obligation* inquiry, noting that arrangements should be technologically neutral to allow for cost-effective solutions (PC 2017b, p. 12), and could include a mix of fixed broadband networks, mobile coverage and satellite services.

The Australian Government currently invests significant amounts in regional digital infrastructure across a range of connection types. Larger national infrastructure programs generally have a strong emphasis on improving regional and remote connectivity, and funding is also allocated to specific regional initiatives.

- The National Broadband Network (NBN) provides broadband infrastructure and access to all Australian premises, predominantly using fixed line connections (representing 92% of its network). A small share of premises are serviced via fixed wireless (5%) and satellite technologies (3%) (DITRDC 2021b, p. 1) — many of these are located in regional and remote areas, 'where premises are spread out geographically over many square kilometres' (NBN 2022). The initial rollout represented a \$51 billion infrastructure investment (NBN 2020).
- The Mobile Black Spot Program (MBSP) seeks to improve mobile coverage across Australia. The government co-invests with industry to encourage mobile network operators to build mobile infrastructure in areas with limited connectivity. Most MBSP sites are in regional and remote areas (figure 3.3), and for some mobile network operators, the majority of regional and remote sites they built in 2021 received government co-funding (ACCC 2021b, p. 12). In total, the government's \$380 million funding commitment to the MBSP has 'generated a total investment of more than \$875 million, to deliver more than 1,270 new mobile base stations across Australia' (DITRDC 2021a).
- The Regional Connectivity Program (RCP) provides grants for 'place-based' telecommunications infrastructure projects in regional and remote Australia. Grants have been provided for a mix of technology types, including projects to deploy new mobile sites and to upgrade or extend fixed networks, some of which also involve industry co-investment. More than \$250 million of government funding has been committed to the RCP's two rounds (DITRDC 2022b).

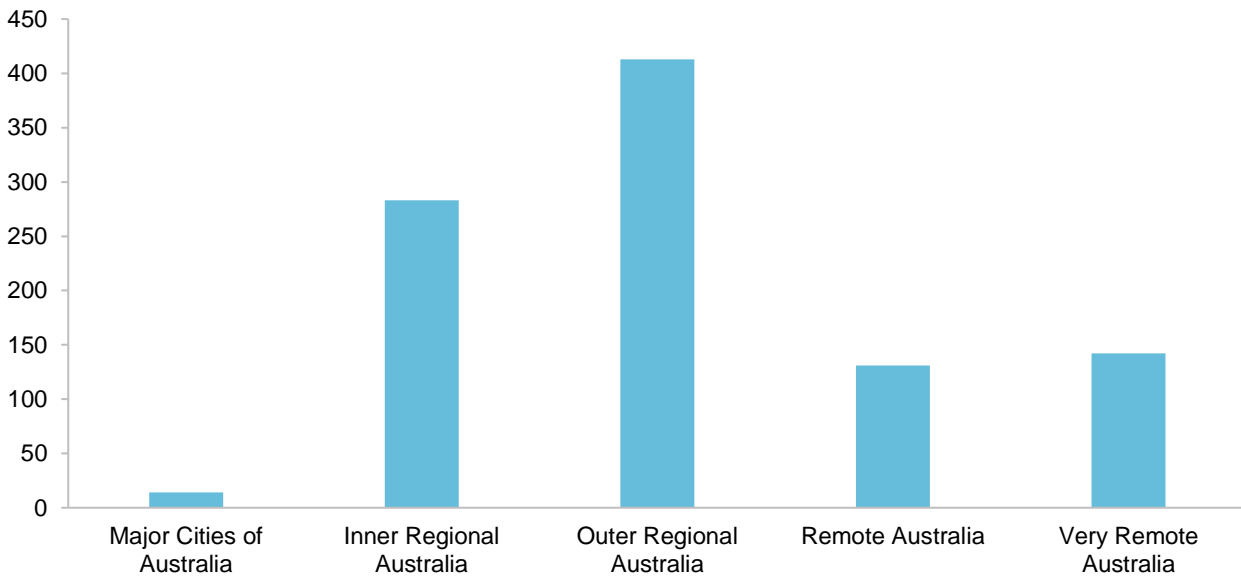
At the same time as this significant government investment, there is also substantial private sector activity in developing regional digital infrastructure in Australia.

- Telstra announced a total investment of \$350 million in 2021 to improve its regional and rural networks, predominantly to enhance and extend mobile coverage. This funding was said to be in addition to the projects that Telstra had co-invested in with the Australian Government at the time (Penn 2021).
- Telstra has also partnered with satellite communications companies ViaSat and OneWeb to offer its own satellite services, in competition with the NBN (Burns 2022; Griffith 2022).
- Starlink's satellite internet services are available in some parts of Australia. The company has ground stations — which connect to its satellites to provide internet services — in New South Wales, Victoria, Queensland, South Australia and Western Australia, and a licence from the Australian Communications and Media Authority (ACMA) to sell its services Australia wide (ACMA 2021b; Fogg 2022).

- HyperOne announced a \$1.5 billion investment in 2021 to build a 20 000 km network of optic fibre cable connecting every Australian capital city. The network would have ‘more than 1000 “on-ramps” in regional and remote Australia’ (Crozier 2021), which would improve connectivity in these areas.

Figure 3.3 – Most Mobile Black Spot Program sites are located in regional and remote Australia

Number of MBSP sites by location, 2022



Source: ACCC (2022h, p. 14).

Government investment in regional digital infrastructure should therefore be targeted towards addressing infrastructure gaps, where required, without unduly interfering with private sector activity. As the Commission stated in its 2017 *Telecommunications Universal Service Obligation* inquiry:

... ‘market gaps’ or ‘market failures’ do not in themselves provide a case for government intervention, because such interventions typically generate costs as well as benefits to the community — both directly and indirectly. A case can be made for government to intervene only where there is a net benefit to the Australian community. The relative merits of policy options should then be assessed against cost-effectiveness criteria including:

- the cost to the community of achieving a minimum quality of service
- technological neutrality
- impacts on competition and incentive effects on service providers
- administrative costs and regulatory compliance burdens, with regard to flexibility to adjust to future developments. (PC 2017b, p. 6)



Finding 4.9

Technological change has led to increasing options for internet connectivity

The suitability of fixed and mobile broadband, and satellite technology, as options to reliably connect to the internet differs substantially across Australia. The market for internet connectivity is evolving rapidly, with a range of private sector providers developing regional digital infrastructure that may address some access and reliability gaps.

Better data would assist in linking investment to outcomes

Understanding the genuine gaps where government investment would result in a net benefit to Australian businesses and individuals requires good data about not just the demand for connectivity in regional and remote areas, but also the quality and adequacy of connection options. Indicators such as internet access, upload and download speeds, packet loss and latency need to be analysed at a regional and local level in order to properly identify gaps and target government investment (IA 2022a, pp. 80–99).

Much of the data publicly available on internet coverage and speeds is in aggregate across Australia — for example, the Ookla Speedtest or M-Lab data (section 1.2), though this data suffers from selection issues (AlphaBeta 2019b, p. 9), and data about fixed and mobile broadband use in the ACCC's *Internet Activity Report* (ACCC 2021a), which overcomes selection issues. There is also some aggregate data on internet quality, with the ACCC's *Measuring Broadband Australia* report publishing data on latency, webpage loading time and packet loss frequency for fixed line connections across Australia (ACCC 2022g, pp. 20–22). While these aggregate datasets can be useful, they do not provide sufficiently granular information for targeting location-based investments towards regions where there are gaps in access and service quality.

The information that is currently published on geographic disparities in internet quality and adequacy is limited. There is locational data available on NBN coverage by type of connection (such as fixed wireless broadband connections, DITRDC 2020), but this provides little information about the geographic variation in the quality of connections that are actually used by individuals and businesses. The ACCC has reported that regional outcomes are generally poorer than urban outcomes for fixed broadband services. For instance, the average download performance in regional areas was 95% of advertised plan speeds compared with 98% for urban areas, and the average latency in regional areas was 13.0 milliseconds compared with 10.7 milliseconds for urban areas (ACCC 2022g, pp. 27, 30). However, beyond the broad geographic classifications of 'urban' and 'regional', there were no further breakdowns that would enable poor outcomes to be identified at specific locations across regional Australia.¹⁰

On mobile broadband connectivity data, the ACCC requires mobile network operators to 'report on the locations of their core network and customer access network' under the Audit of Telecommunications Infrastructure Assets — Record Keeping Rules (ACCC 2022e). The maps that are published by these operators provide some information about the availability of mobile coverage in specific locations and the potential quality of connections (based on predicted 3G, 4G or 5G coverage; actual speeds are not part of these maps). The ACCC has observed that their efforts to improve disclosure of data on mobile connectivity outcomes provide 'useful information on the state of mobile networks for policymakers, particularly when formulating policy responses to mobile coverage issues' (ACCC 2021b, p. 2). Telstra submitted that mobile network coverage data tends to depict availability rather than speeds because 'with fixed networks there is capacity to readily observe and report on service standards consistent with plans sold in the market, but mobile networks are not amenable to this given the issues of variability and contention... noting mobile plans are typically sold based on data allowances as opposed to speeds' (Telstra, sub. 174, p. 23).

Ultimately, geographic breakdowns of internet connectivity, quality and adequacy are not available at a sufficiently granular level to measure digital infrastructure gaps and inform targeted government

¹⁰ This is broadly comparable to the geographic granularity available in other developed countries' internet speed data. For example, the *Measuring Broadband America* reports publish national statistics about measured download speeds, latency and packet loss for selected internet service providers (FCC 2021). The *Measuring Broadband Canada* program adopts a similar approach to collecting performance data as Australia and the United States (CRTC 2020). In the European Union, the *Digital Economy and Society Index* includes country-level data on the share of households with broadband connections above particular thresholds (2 Mbps, 30 Mbps, 100 Mbps, 1 Gbps) (EC 2021a).

investment.¹¹ To inform its assessment of broadband and mobile connectivity gaps in the Regional Infrastructure Gap Prioritisation Framework (discussed above), Infrastructure Australia undertook extensive surveys, submissions and regional workshops (IA 2022b, p. 21). A more comprehensive and granular source of data about connectivity outcomes, collected on an ongoing basis, would improve location-based decisions for the public and private sectors about how and where to invest in regional digital infrastructure.

In addition to informing investment decisions, improved data on internet speeds would also enable more informed regulation. The Australian Government has implemented a Universal Service Guarantee (USG) requiring that ‘all Australians [have] access to broadband as well as voice services’ (DITRDC 2021b, p. 1).¹² The guarantee includes minimum standards for peak broadband speeds, and these needs are likely to change over time as demand for data and connectivity increases in the future. As such, the *2021 Regional Telecommunications Review* recommended that: ‘the minimum USG standards, including download/upload speeds and performance during peak or busy hours, will need to increase and should be subject to an annual review, particularly for consumers outside the NBN fixed line footprint’ (RTIR Committee 2021, p. 12). This would be most effectively paired with better data on connection access, quality and adequacy.

But collecting this data at a granular geographic level is not a straightforward task. For instance, in its analysis on mobile connectivity in its *Mobile Infrastructure Report 2021*, the ACCC noted that assessing mobile coverage by location can be challenging because ‘the mobile network operators use predicted coverage as the basis for their coverage maps, and their input assumptions and metrics are different. They can also change input assumptions from time to time, which makes it difficult to accurately assess coverage changes’ (ACCC 2021c).

Data about the ability for individuals and businesses to use the internet would ideally be collected based on the desired outcome — that is, whether access to and the quality of connections is fit for purpose. Consistent outcomes data about internet access and the quality and adequacy of connections in particular areas, across all types of connections (fixed broadband, mobile broadband and satellite), would facilitate technology-neutral decisions about what investments are most appropriate for specific locations where government funding may be required.

Improving transparency on how investment decisions are made

Despite the significant government investments in regional digital infrastructure (discussed above), there is a lack of transparency about how these investments are made and which priorities are pursued. Allocating funding under programs such as the NBN, MBSP and RCP to specific areas or connection types means less funding available for investment in another location or technology. There is limited transparency about how such trade-offs have been weighed and if decisions made appropriately considered the relevant benefits and costs.

¹¹ The analysis in this chapter is primarily based on publicly available data about connectivity outcomes. It is unclear whether providers and/or regulators have access to unpublished information at a more granular geographic level.

¹² The USG’s reference to voice services reflects the fact that it incorporates the old Universal Service Obligation (USO), which guaranteed access to landline telephones and payphones. The inclusion of broadband services in the USG, which was first announced in 2017 as part of plans to replace the USO, was intended to align the guarantee with the ‘significant changes in technology, the marketplace and customer preferences’ (DCA 2018, p. 7) that have taken place in more recent years — with reliable access to internet now essential for participating in the modern Australian economy and society. The technology options that are now available to deliver internet (discussed above) are also able to provide voice services, either directly or effectively as a by-product of data services (e.g. voice calls via the internet).

For example, although the Department of Infrastructure, Transport, Regional Development, Communications and the Arts assesses RCP grant applications based on publicly available program guidelines (DITRDCA, sub. 201, p. 10), the Australian Communications Consumer Action Network:

... expressed concern regarding the Federal Government's Grant Guidelines for the RCP Round 2 ... [it] considers whether the project supports a government priority without clearly defining what the government priority may be, in addition to the Department reserving the right to recommend funding a project which may be lower ranked against merit criteria. Stipulations such as this within grant guidelines adds uncertainty and reduces transparency from the grant process. (ACCAN, sub. 118, p. 7)

And while it is clear that much of the MBSP program targets investment in regional and remote areas (figure 3.3, DITRDC 2021a), and the government publishes data about community-reported mobile black spots (Australian Government 2021b), there is opacity about how the mobile sites are prioritised and selected for government investment. The Commission previously recommended in 2017 that transparency in funding decisions could be improved by:

... commission[ing] an independent evaluation of the Mobile Black Spot Program. Such an evaluation should consider measures to improve the program's operation, to best ensure that the program's objectives are prioritised and site selection is evidence-based. (PC 2017b, p. 23)

This recommendation was not accepted by government.

A similar case can be made for improving transparency about government decisions on providing funding to the NBN. For instance, the 2022-23 Budget included a \$480 million grant to upgrade the NBN's fixed wireless towers, which will improve broadband speeds and increase data allowances for some users (DITRDC 2022a). In addition, the government announced in October 2022 that it will provide a \$2.4 billion equity injection to expand fibre-to-the-premise connections to a further 1.5 million premises. In both cases, funding has been allocated without a competitive process, with the claim that 'given the investment to date in the network and the incremental cost of upgrading it and the other options available, the Government considers this is a value for money investment' (DITRDCA, sub. 201, p. 7). However, it is unclear how the decision was made to allocate government investment towards these connection types or locations. It will be important that these upgrades are accompanied by transparency about how and why they are to be undertaken, to ensure taxpayer funds are being spent efficiently.¹³

In addition, State and Territory Governments also make significant investments in regional digital infrastructure that would benefit from increased transparency about how funding decisions have been made. These include the Connecting Victoria Program, NSW Regional Digital Connectivity Program, WA Digital Connectivity Program and South Australia's Mobile Network Extension Devices Pilot Program (Gary McLaren, sub. 137, p. 5).

Periodic independent reviews of digital infrastructure programs such as the RCP, MBSP and NBN would increase the likelihood that government funding for such investments is allocated to those specific locations and technology types that would yield the highest benefits for the community. Evaluating these investments

¹³ In addition to individual grants and equity injections, the NBN also receives funding for its loss-making fixed-wireless and satellite services through an internal cross-subsidy that is supported by the Regional Broadband Scheme levy. In the Australian Government Competitive Neutrality Complaints Office's investigation of NBN Co, the Commission recently observed that the government could replace this levy arrangement with direct Budget funding for these non-commercial services (an option that has also previously been suggested by the ACCC) (PC 2022, p. 41). This would provide more transparency about the costs of providing these services. It may also be used to transition towards the more competitive funding arrangement discussed below, whereby the direct funding could eventually be made available to the provider that can deliver the required services in the most cost-efficient way, as identified through a tender mechanism.

would also enable governments to assess whether current funding allocations and policy settings are appropriate as demand and supply in the market changes for other reasons — for example, strong population growth in particular towns or increased private sector investment in regional digital infrastructure. This allows governments to adjust their investments accordingly over time.

Technology improvements could enable more competitive funding arrangements

Given the complex technology- and location-specific aspects of connecting regional and remote Australia to the internet, there may be a more efficient way for government to fund digital infrastructure investments. It can be difficult for the government to decide on the type of infrastructure that would most cost effectively deliver the USG's minimum standard in a given location. The government could instead consider using a technology neutral market-based mechanism such as competitive tendering, which may lead to more efficient outcomes and address gaps in regional and remote connectivity at lower cost. The mechanism could also be designed to promote data collection on service outcomes and transparency on funding decisions.

For example, instead of allocating regional digital infrastructure funding through programs such as the NBN, MBSP and RCP, the government could offer to pay the lowest-bidding service provider to deliver connectivity to a particular area, defined at the regional level, subject to conditions such as minimum service standards and maximum prices charged to consumers. The government would have flexibility in defining these conditions across different regions; for example, there may be equity or social inclusion reasons (discussed above) for requiring relatively lower price caps in very remote areas, if people have less ability to pay for basic internet services in these locations. Tenders could also be designed to give service providers flexibility to realise economies of scope across different regions, such as by allowing combinatorial or package bidding, so that providers can bid for a package of locations where there might be efficiency gains from supplying all of these areas together.

Successful tenders may include an upfront payment, with full funding to be provided over time as the provider delivers on their commitment — contracts should therefore be of a sufficient length for service providers to earn a return. A new tender would be issued after this period to ensure providers remain competitive. If thin markets are an issue and the call for providers in a particular location leads to only one party being willing to participate in the tender, the government may need to enter into individual negotiations with that provider — effectively the provider of last resort — to avoid being held captive by that one party.

The intent of such a mechanism would be that government pays the least-cost private provider to guarantee a minimum service level in each location, with the cost to government determined by the market. It would not preclude other private sector providers from competing in that region, such as by offering more advanced or niche products that consumers may be willing to pay more for, or if they lower their costs by investing in new technologies over time.¹⁴

The Commission has previously recommended competitive tendering for public infrastructure and services provision, noting that it creates incentives for providers to keep prices closer to the cost of delivery (PC 2014,

¹⁴ This section's discussion about competitive tendering for the USG is focused on connectivity in regional and remote Australia, as it is in these areas that the government's activity would have larger benefits in delivering more efficient outcomes. The 'universal' aspect of the USG means that the Australia-wide mechanism would apply to metropolitan areas as well, with a tender offered for each metropolitan location (just as regional and remote tenders would be defined by location). However, as the higher population density in metropolitan areas means that it is generally commercially viable for multiple broadband service providers to co-exist and compete (for example, ACCC 2021d), in practice a competitive tender for these locations would be bid down to zero.

2015, 2017b). In its *Telecommunications Universal Services Obligation* (USO) inquiry, the Commission also observed that a tender mechanism for these specific services should:

- specify service requirements as outcomes rather than prescriptive inputs, technologies or processes, as this encourages innovation and lower-cost service delivery
- require clear performance reporting to allow for provider accountability and enable government to identify gaps in service provision
- acknowledge the advantage that incumbents or dominant providers have in tendering, and avoid discriminatory service requirements (PC 2017b, p. 260).

In considering the design of a tender mechanism for funding digital infrastructure investment to deliver the USG (which replaced the USO), similar principles apply. For example, outcomes-based requirements for reliable and good quality internet services could include upload and download speeds,¹⁵ latency or even the ability to access essential services online (such as telehealth). And existing data about service outcomes could be improved as part of implementation, such as by requiring service providers to self report outcomes as part of the tender's performance reporting requirements, complemented by independent assessments of internet reliability and quality.

In relation to existing providers that may dominate the regional digital infrastructure market, some service providers already observe that Telstra and NBN Co are large incumbents in regional and remote Australia.

- Competitors have argued that Telstra's physical line network, partly funded through government subsidies over the years, provides advantages in delivering mobile services as it supports greater backhaul capacity in regional and remote areas (Optus 2016, p. 23). As such, even though the MBSP uses tenders to allocate funding, 'in reality Telstra faces little competition across areas where other mobile network operators lack backhaul capacity to support the cost-effective rollout of these new base stations' (VHA 2016, p. 12).
- Previous government funding and policies aimed at subsidising the NBN in regional and remote areas could provide NBN Co with a competitive advantage. For example, the Regional Broadband Scheme was created to 'fund the financial losses of NBN Co's fixed wireless and satellite networks' (ACCC 2020, p. 1), requiring telecommunications providers to pay a levy to NBN Co for each premise they supply with a designated broadband service over a local access line owned by the provider (ACMA 2021a). This disincentivises providers from building and using their own fixed line infrastructure (Boyd 2021).

The government trialled a market-based mechanism to deliver the USO in 2001 to reduce costs, increase transparency, improve performance and compliance, and encourage new providers to enter regional markets (Jackson 2000). However, the trial was not a success as no providers participated in the scheme:

Under this pilot program, carriers could nominate to be a universal service provider in one or both of the two nominated areas and would receive a set subsidy for each customer they supplied in that area. Carriers were required to supply any individual requesting a service within the nominated area, which meant that potential competitors were required to have a network capable of supplying every individual within the area. No carrier nominated to become a universal service provider under this scheme. (ACCC 2007, p. 12)

The ACCC later observed that competitive tendering for the USO had become more feasible in the years following the 2001 trial due to technological advances (ACCC 2007, p. 12, 2016, p. 7). With further

¹⁵ As an international example, in July 2022 the Chairwoman of the US Federal Communications Commission suggested that the national standard for minimum broadband speeds be increased from 25 Mbps to 100 Mbps for downloads, and 3 Mbps to 20 Mbps for uploads. Chairwoman Jessica Rosenworcel also proposed that the FCC 'consider affordability, adoption, availability, and equitable access as part of its determination as to whether broadband is being deployed in a reasonable and timely fashion' (FCC 2022).

advancements in technology and increasing competition in the broadband market (across fixed, mobile and satellite connections), the government may be in a better position to deliver the USG through tender.

Participants to this inquiry expressed mixed views on whether such a tender mechanism would work in practice at the present time. Several stakeholders observed that delivering the USG via competitive tender would encourage internet connectivity to be delivered at lower cost from a range of providers; foster competition by providing opportunity to smaller industry players; improve the transparency, accountability and efficiency of government investment; and enable more extensive data analysis to inform investment decisions (ACCAN, sub. 118, p. 8; Gary McLaren, sub. 137, p. 8; IAA, sub. 168, p. 2). And some stakeholders also highlighted low earth orbit satellites as a particular type of technology that is already being offered in Australia and could change the way that the USG is delivered in regional and remote areas (Gary McLaren, sub. 137, p. 6; NBN Co, sub. 147, p. 12; Vocus Group Ltd, sub. 121, p. 2).

However, questions remain regarding whether technology and market competitiveness have sufficiently developed in regional and remote areas to feasibly implement a competitive mechanism for the USG at the current time. Although this section has outlined various examples of private sector investment in regional digital infrastructure and new providers entering the overall Australian market, it is unclear whether they would elect to participate in tenders to deliver the USG across all or most of the regions defined by the government. The Department of Infrastructure, Transport, Regional Development, Communications and the Arts observed that for smaller service providers and start-ups, 'their capability and long-term sustainability would need to be considered closely. The implications of providers cherry-picking more lucrative or desirable markets would need to be considered' (DITRDCA, sub. 201, p. 14). And NBN Co noted that:

... there may be a tension between allowing private participants to selectively pick (by tendering) specific areas to serve and the efficiency with which less commercial areas can be served. Economies of scale are critical to development and deployment of telecommunications infrastructure ... At present, neither vertically integrated smaller providers nor bigger foreign players are likely to have on-ground service and support capabilities to adequately serve large or multiple parts of regional Australia. (NBN Co, sub. 147, p. 8)

Transitioning existing government funding arrangements for regional digital infrastructure to a tender mechanism would lead to more efficient outcomes, but moving too early before technologies and markets are sufficiently developed to support a more competitive approach to funding risks failure. The government should therefore seek to transition towards such an arrangement once it is feasible, and could undertake market testing to understand whether this is possible now or, if not, at what point in the future implementation would be appropriate given the expected trajectory of technological and market development. Such an assessment could be undertaken by the ACMA and/or the ACCC.



Finding 4.10

Government investment in regional digital infrastructure often lacks transparency

Current funding arrangements for regional digital infrastructure involve government decisions about the types of technology and locations receiving public investment, and these decisions often lack transparency. Productivity-enhancing access to low-cost and reliable internet services could be delivered through a more competitive and transparent approach that facilitates market participation by a range of providers, such as through competitive tendering. Tenders could be technology neutral and adapted to different regional and remote community needs (on service outcomes and price), but the approach requires sufficient technological and market development to be feasible.



Recommendation 4.1

Better access to digital infrastructure in regional communities by improving funding mechanisms

The Australian Government should more efficiently and transparently fund digital infrastructure investments to motivate improved provision in Australia's regional communities.

This would ultimately require a transition in funding arrangements from the current patchwork of programs to a single market-based tender mechanism for delivering the Universal Service Guarantee, once the market for internet connectivity services across all technology types (fixed line, mobile, satellite) is sufficiently competitive to support such an arrangement.

The government should request that the Australian Communications and Media Authority and/or the Australian Competition and Consumer Commission undertake market testing to understand whether it is currently feasible or, if not, when technology improvements and new market entrants would enable a more efficient tender mechanism to be implemented.

In the meantime, governments should improve transparency about how funding is allocated for existing regional digital infrastructure programs, including publishing the reasons for funding decisions and evaluating the outcomes of previous investments.

3.2 Creating new data sharing and integration opportunities

There have been several government initiatives to improve data sharing since the Commission's 2017 *Data Availability and Use* inquiry (PC 2017a): box 3.1 describes actions for sharing government data, while the Consumer Data Right (CDR) is discussed in the section below. The strong focus on sharing public sector datasets is consistent with global policy activity — an OECD survey of 205 data sharing initiatives across 37 countries found that 'the large majority of government initiatives focus on access to and sharing of public-sector data (almost 65% of all initiatives), with the majority of these initiatives aiming at enabling open access to government data' (OECD 2019, p. 117).

Box 3.1 – Recent initiatives to improve public sector data sharing

The Australian Government has implemented a national regime for sharing public sector data through the *Data Availability and Transparency Act 2022* (Cth) (DAT Act). The Act facilitates data sharing from 'data custodians', which are generally Commonwealth agencies, to 'accredited users', who have been approved to receive data for the purpose of improving service delivery, informing policy development and/or research. The legislation also establishes the National Data Commissioner, an independent regulator responsible for overseeing the data-sharing scheme and broader education activities about public sector data sharing and use (ONDC 2022).

The proposed data sharing model in the original DAT Bill allowed for public sector data to be shared with the private sector. However, following amendments, the legislation that was passed specified that

Box 3.1 – Recent initiatives to improve public sector data sharing

industry and other private organisations are not allowed to participate and receive data in the scheme (Sadler 2022). As the reason for initially excluding the private sector was to establish the scheme and allow it to mature, some stakeholders have observed ‘it may be that following further review, the DAT Act will eventually be expanded to allow private sector organisations to receive public sector data’ (Catania, Wheelahan and Mani 2022). The Act stipulates that there will be a review of the scheme in three years, along with a five-year sunset clause.

The DAT scheme underpins the government’s *Australian Data Strategy*, which was released in May 2021 (PMC 2021b). The strategy and its supporting action plan (PMC 2021a) outline the Australian Government’s three data priorities — enabling greater data use, improving data safety and security, and maximising the value of data — and highlight how separate government initiatives and policies align with these priorities. Government investments in specific datasets and infrastructure mentioned in the action plan include:

- the Data Integration Partnership for Australia program and creating the Multi-Agency Data Integration Project (MADIP) and Business Longitudinal Analysis Data Environment (BLADE), which respectively link the government’s people-based and business-based datasets for policy research. These have been used to inform the COVID-19 vaccine strategy by sociodemographic cohorts, measure the employment and social outcomes of vocational education students, and examine the benefits of government support for Indigenous environmental programs (ABS 2022a, 2022c)
- the Digital Atlas of Australia, an interactive online platform that will link Australian Government datasets based on location, to be beta-tested in mid-2023
- sector-specific initiatives in areas such as collecting and sharing freight data, modernising waste data visualisation, integrating regional datasets and gathering more geoscientific data on Australia’s resources.

Separately, the *Intergovernmental Agreement on Data Sharing* was signed by the Australian and State and Territory Governments in July 2021. All jurisdictions have committed to sharing public sector data ‘as a default position, where it can be done securely, safely, lawfully and ethically’ (National Cabinet 2021, p. 1). Data will be shared under existing privacy laws (including the *Privacy Act 1988* (Cth) and state and territory privacy legislation) for the purposes of ‘informing policy decisions; designing, delivering, and evaluating programs; tracking implementation; and/or improving service delivery outcomes’ (National Cabinet 2021, p. 2).

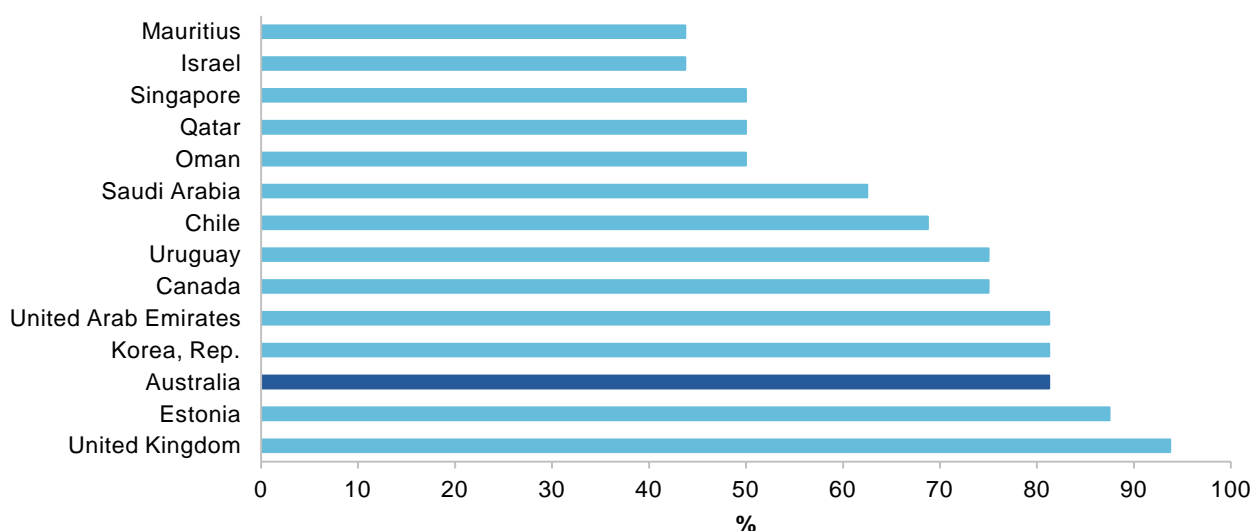
Australia performs relatively well on government-facilitated data sharing compared with other countries. For example:

- the UN’s *E-Government Survey 2020* reported that Australia has a ‘very high’ level of open government data, based on an index examining countries’ foundational policy frameworks, data-sharing platforms and data availability in various sectors (UN DESA 2020, pp. 258, 317)
- the Global Open Data Index 2016/2017 ranked Australia as second out of 94 countries on the publication of government data, with particularly high scores in the availability of national statistics, high-level budgets and geographical information (such as maps and administrative boundaries) (Open Knowledge Foundation 2017). However, Australia performed poorly on publishing detailed transactional data on government expenditure
- the World Bank’s 2021 Global Data Regulation Survey examined 80 countries on 37 data-related policies, including 16 enablers of data sharing that relate to accessing public intent data and reusing private intent data (World Bank 2021b, ch. 6). High-income countries had adopted more enablers than middle- and low-income countries, and Australia ranked high relative to other high-income countries (figure 3.4).

However, while Australia has some data sharing frameworks and infrastructure in place, there is still significant room for improvement to generate value and productivity growth from the use of data accessible under these frameworks. This includes increasing the number of organisations and individuals able to take up new opportunities to access and use data under these frameworks, and improving data availability and sharing in sectors of the economy where data remains relatively inaccessible but there is potential for significant benefit. It is particularly important to act now to leverage the increasing volumes of data that are being generated as more economic activity is digitised, including since the COVID-19 pandemic (as discussed in chapter 1).

Figure 3.4 – Australia has relatively mature data enabler policies

Share of enabler regulatory practices adopted by high-income countries, 2021^a



a. Estimates are based on the Global Data Regulation Diagnostic Survey Dataset 2021, published by the World Bank. The dataset includes five data enabler policies relating to e-commerce, seven relating to public intent data and four relating to private intent data. Where the dataset includes multiple responses for a single policy, these responses have been aggregated to a single measure for that enabler. For example, a country is deemed to have common technical standards in place for government entities if it mandates at least one of the four types of standardisation options; it is not necessary for the country to have all four in place.

Source: World Bank (2021a).

More value from consumer data portability

The amount of data produced and analysed by the private sector has continued to increase rapidly since the Commission's 2017 *Data Availability and Use* inquiry (PC 2017a, p. 80). The potential to use this data to improve decision making, tailor services for customers and generate operational efficiencies is now well established. Governments can support greater sharing and use of consumer data through data portability policies, enabling consumers to authorise businesses holding their data to provide that data to third parties. Australia's Consumer Data Right (CDR) is an important example of enabling data portability for consumer benefit (box 3.2). To avoid disincentivising data collection and use (section 2.2), portability should be limited to data that is jointly produced by consumers and businesses through transactions between these parties, rather than being required for data that businesses have analysed and added value to. Australia's approach to consumer data portability is 'unique [compared with other countries] in its commitment to implement

economy-wide standardisation of consumer data with the only limits to the range of services enabled by CDR being “the imagination of entrepreneurs” (Buckley, Jevglevskaia and Farrell 2022, p. 26).

Box 3.2 – The Consumer Data Right rollout is progressing

A Consumer Data Right (CDR) was enacted by the Australian Government through the *Treasury Laws Amendment (Consumer Data Right) Act 2019* (Cth). The CDR is being rolled out in stages, with ongoing consultation with industry and other stakeholders being a key part of the staged rollout.

The banking sector was first to be designated for the CDR in September 2019. Data sharing requirements were gradually phased in, starting with product and customer data on individual accounts, followed by information about business finance. The rollout was also staged such that the major banks were required to commence their data sharing obligations before non-major banks (Australian Government 2021a). As at mid-December 2022, there were 38 accredited data recipients (ACCC 2022b) and 114 active data holders (Australian Government 2022).

Implementation for the energy sector, which was designated in June 2020, is in progress. The rollout is another staged approach whereby product and customer data sharing obligations first commence for the three largest energy retailers, Australian Energy Regulator and Australian Energy Market Operator. Sequencing of the energy sector rollout, which began in October 2022, ‘aims to ensure that CDR obligations first commence with participants that will provide the greatest coverage to enable consumers to benefit’ (Treasury 2021a, p. 4).

Telecommunications was the most recently designated sector in January 2022. Similar to banking and energy, the information that will be shared under the CDR includes product and customer data, with the government planning to consult with industry on the rules and standards to apply (Kwan 2022).

Several recent reviews have examined opportunities to expand the CDR framework.

- The 2020 *Inquiry into Future Directions for the Consumer Data Right* examined how to expand the CDR’s functionality and link CDR infrastructure with the broader data and digital economy (Farrell 2020). Its 100 recommendations included reforms to implement action initiation, such as payment initiation and account switching (discussed below). The government has agreed or agreed-in-principle to 94 of the inquiry’s recommendations (Treasury 2021b).
- In late 2021, the Commonwealth Treasury undertook a Strategic Assessment on the next sectors and datasets that should be covered in the CDR rollout. It concluded that open finance should be the next area of focus, targeting high-value datasets from the superannuation, general insurance, merchant acquirer and non-bank lending sectors, as well as complementary data held by governments (Treasury 2022b).
- The Statutory Review of the Consumer Data Right, released in September 2022, reiterated the potentially significant impacts of action initiation under the CDR. For example, the CDR could facilitate digital payments as ‘its unique framework for secure transfers of consumer, product and service data can integrate with and augment existing and emerging payment channels’ (Treasury 2022c, p. 5).

While the CDR rollout is progressing and providing strong foundations for consumer data sharing, a great deal of the value that could be created from this data portability has yet to be realised. For example, in the banking sector, there are only 38 accredited data recipients and development of innovative products or improvements to customer service based on the CDR appear to be in their early stages still.

Some reports suggest that service providers are starting to replace 'screen-scraping' methods of collecting customer data (which are unregulated, more costly and less secure) with accessing higher quality information through the CDR. One fintech has observed that the CDR's 'cleaner set of data ... is important as we look to add insights to help the emerging customer experience — like instant decisioning, straight-through-processing, or various nudges lenders can make to consumers' (Eyers 2022b). However, variable data quality from some banks and the time required to fix these issues (sometimes more than a week) may slow uptake (Eyers 2022a). The ACCC introduced a CDR sandbox in July 2022, providing an environment for potential and current CDR participants to test their CDR offerings and solutions, which could assist in improving data quality (ACCC 2022a).

Expanding the CDR's sectoral coverage and incorporating additional functions will create new uses of and therefore value from the data. Gemaker submitted that 'extend[ing] more rapidly the Consumer Data Right regime implemented for banking and energy – which has provided a strong basis for citizen trust – into other sectors [would] promote digital innovations that deliver similar productivity and user benefits' (Gemaker, sub. 13, p. 3). In addition, enabling action initiation in the CDR has the potential to result in significant consumer benefits, including:

... overcoming [consumers'] friction when carrying out actions with their providers, as well as behavioural issues such as status quo biases... and reduc[ing] the complexity, time and costs to consumers seeking to carry out actions. Action initiation could support a range of actions that may be undertaken on the consumer's behalf. These may differ depending on each sector but could include enabling [an] accredited person to initiate payments, update personal information, change billing delivery preferences, open and close accounts and assist consumers to switch from one provider to another. (Farrell 2020, pp. 19–20)

The government sought comment on exposure draft legislation to enable action initiation in late 2022. This would allow the CDR to 'create a new channel for consumers to instruct a business to initiate actions on their behalf and with their consent. These actions could include making a payment, opening and closing an account, switching providers and updating personal details (such as address) across providers' (Treasury 2022a, p. 1). Ultimately, making it easier for consumers to switch between products and providers will spur competition between businesses to deliver better services to Australian consumers.



Finding 4.11

The Consumer Data Right is a good foundation but has low uptake

The Consumer Data Right (CDR) provides a strong foundation for consumer data sharing, but relatively low uptake means its economic benefits are yet to be fully realised. Initiatives such as the CDR sandbox, which may improve data quality, and introducing action initiation could increase uptake in the future.

More value from data provided to government agencies

Notwithstanding the advances in data sharing over the past five years, there remains significant potential to improve — for the benefit of the community — the sharing, integration and use of data that is held by government agencies. While progress on the underlying frameworks and legislation has been made over recent years (box 3.1), some stakeholders observe that the cultural barriers preventing greater data sharing — which were highlighted in the Commission's 2017 *Data Availability and Use* inquiry — still exist today.

The [Commission's 2017 inquiry] found 'a very real culture of risk aversion and risk avoidance in the public sector when it comes to data release'. Anecdotally, this culture of risk aversion and avoidance has changed little since then. ... the main impediment to data sharing is still a cultural one, supplemented by a lack of clear agency-specific guidelines and guardrails as to what can be shared, to whom and in what circumstances. (Christie and Wong 2021)

It is important to think broadly about what data can be shared and combined, and the potential users who might create value from this data. This could include agencies from different levels of government (including local government) and universities, as well as benefits arising from cross-sector uses of data; for instance, businesses or not-for-profit organisations deriving value from combining their own data with government data. Breaking down silos between these groups, such as via data sharing agreements¹⁶ or other partnerships (in the case of data users outside of the public sector and academia), could create new opportunities for data use.

Agencies that successfully embark on collaborative data sharing initiatives should be highlighted as examples where risk aversion has been overcome to yield benefits for businesses and individuals, as their experiences can provide lessons for others seeking to improve data sharing and use. The Australian Taxation Office (ATO) and ABS are prominent examples of how government agencies can lead the way in creating shared value using data they collect and hold, and the National Disability Insurance Agency (NDIA) has also commenced digital and data partnerships with the private sector in recent years (box 3.3).

Based on the experiences of these government agencies, features of successful arrangements that have created value via data sharing include:

- *Working with digital service providers to integrate data requirements into software products* that are already used by businesses, to reduce reporting burdens and maintain data quality. In implementing the Single Touch Payroll (STP) system, which captures near-real time payroll information entered by businesses in their accounting software, close collaboration between the ATO and digital service providers 'was a huge factor in the program's success' (DSPANZ, sub. 18, p. 2). The ATO set up a Digital Partnership Office to facilitate this collaboration. The NDIA has a Digital Partnership Program with a similar purpose.
- *Supporting businesses with more limited capacity or digital capability.* The ATO adopted a staged approach to implementing STP to assist employers through the transition: large employers were required to report via STP before small employers, and there were concessions for some businesses that needed more time, such as micro employers and seasonal employers (ATO 2021c, 2021a, 2021b). Meanwhile, the NDIA allows smaller service providers to connect to their data and systems via 'aggregator' software companies, enabling the benefits of improved data use to flow broadly across the sector, including to providers that would not have the capability to connect directly to the NDIA's systems themselves.
- *Considering innovative and high-value uses of data* across public and private entities, beyond meeting administrative and operational needs. For example, the ATO makes de-identified individual and business tax data available to be linked to other datasets in MADIP and BLADE, for research purposes (box 3.1). STP data is used to support government policy decisions and service delivery, including as a critical input for the government's economic response to COVID-19 (Hambur et al. 2022). The ABS is also seeking to combine and report data collected from businesses' accounting software back to businesses so that they can compare their performance against others.
- *Using data sharing to build relationships in the broader ecosystem.* In the Commission's consultations, one business described the ATO's leadership as a 'symbiotic relationship' with industry — the agency has enabled more data collection and sharing through STP and other digital initiatives, which has, in turn,

¹⁶ The *Data Availability and Transparency Act 2022* (Cth) provides for accredited data users and data custodians to enter into data sharing agreements for the use of data in particular projects that serve the public interest.

allowed technology providers to create new value in the wider business ecosystem. And the NDIA's focus on digitisation and data has led to the formation of a Digital Community of Interest, where organisations share learnings and feedback about the change process.

Box 3.3 – Examples of government and private sector digital and data partnerships

The Australian Taxation Office (ATO) provides a case study on how government agencies can lead the way in creating shared value using data. Significant volumes of data must be collected from individuals and businesses every year as part of tax administration. The ATO sees data usage — and digitisation more broadly — as an opportunity to improve taxpayers' engagement with the tax system, by facilitating 'well-designed client experiences' in a system where it is 'easy to comply, but hard not to' (Hirschhorn 2021).

To improve digital uptake and support new uses of data, the ATO works with digital service providers (which provide accounting, tax and other software to businesses) to integrate data requirements into their software products, minimising reporting burdens while maintaining information quality. The agency has a Digital Partnership Office to support these collaborations with the private sector, which has enabled, for example, the co-design of software standards and security mechanisms (ATO 2019).

Moreover, the ATO's leadership in technology and data use has encouraged many Australian businesses to digitise and adopt potentially time-saving software solutions. For example, prior to the introduction of the Single Touch Payroll (STP) system, which commenced in 2018 and captures near-real time payroll information entered by businesses in their accounting software, about 48% of employers lodged their payment summary annual report with the ATO in a non-electronic format. Now in 2022, approximately 90% of employers interact electronically with the ATO in near real time as they run their payroll and report that information (ATO, pers. comm., 17 May 2022).

There are currently more than 300 STP product offerings listed on the ATO's online register of commercially available products (ATO 2022), and ecosystems of digital service providers have grown around the data that businesses are entering into their software platforms. For example, the cloud-based accounting software provider Xero underpins a platform of over 1000 apps. These apps take data that businesses enter into Xero, combine it with other sources and tools, and produce valuable insights such as cash flow forecasts, dashboard reporting, flagging risks and linking to e-commerce platforms. In 2020, each developer or app partner in this Xero ecosystem spent more than \$20 000, on average, on innovations such as increasing efficiency, implementing new ideas and anticipating future needs (Xero 2021b, p. 15). The ATO has catalysed innovative activity in such ecosystems — it established and maintains the framework for collecting businesses' data, enabling software providers to push this data back to businesses in more valuable forms (with consent and appropriate protections).

The ABS is working with digital service providers to allow businesses to complete the Quarterly Business Indicators Survey through their accounting software from March 2023. Businesses will benefit in several ways: first, 'small and medium businesses will spend at least 70% less time completing ABS surveys'; and second, the ABS will be able to use and combine the collected data to 'provide tailored reports back to business to help them understand their performance against similar businesses' (ABS nd; PMC 2022a).

Government leadership in data sharing partnerships across agencies and sectors should not be limited to business transactions and accounting data. The National Disability Insurance Agency (NDIA) has a Digital Partnership Program, which 'manages controlled and secure access to some of the NDIA's data and systems ... so providers and software developers can build new tools, applications and digital

Box 3.3 – Examples of government and private sector digital and data partnerships

marketplaces to improve how participants, providers and the NDIA all connect and work together' (NDIA 2020). The program had 240 digital partners as at June 2022, comprising directly connected registered providers (often larger service providers) and smaller providers that indirectly connect through 'aggregator' software companies (NDIA, pers. comm., 10 June 2022).

Provider access to the NDIA's application programming interfaces under the Digital Partnership Program has enabled the streamlining of a range of National Disability Insurance Scheme (NDIS) transactions. The provider adoption curve generally starts with lower-risk but prolific transactions, such as more visibility over NDIS participants' plans and service bookings, before progressing towards more complex transactions, such as claims processes, as providers build confidence in the streamlined processes. More broadly, a Digital Community of Interest — with over 20 organisations and members across providers, participants, peak bodies and software developers — enables learnings and positive changes to be shared among interested parties. The group meets multiple times a year, which provides opportunities for the NDIA to receive feedback on what is working and what to progress next (NDIA, pers. comm., 10 June 2022).

One area where there is opportunity to get more value from data provided to government, and increase digital uptake across the population, is the Australian Government's Digital Identity initiative. This is a voluntary, centralised system for identity verification when accessing online services. Individuals create a digital identity through accredited identity providers (including the ATO, Australia Post and Mastercard, with other providers to be added), which set up and manage a digital identity account, and credentials such as passwords are managed by accredited credential providers (DTA 2022b). The system is designed to preserve privacy using rules and standards set out in the Trusted Digital Identity Framework, with individuals sharing only relevant details and service providers unable to seek further personal information without consent.

The Digital Identity system aims to improve convenience, as individuals no longer need multiple logins to access different services, and security, as identity verification is centralised so separate service providers do not need to collect and store sensitive information such as driver's licence and passport numbers (Bennett and Davidson 2022; Shah 2022). Fewer reproductions of sensitive information reduces the risk of third-party losses of personal information to security breaches. This is especially pertinent in light of sensitive data breaches at some large Australian businesses in late 2022, such as Optus and Medibank. The head of Australia's Digital Transformation Agency noted that had there been 'a working identity system, Optus would not have had to hang on to all the personal data that is now in jeopardy' (Burton 2022a). These security benefits should be clearly communicated to Australians, to encourage adoption of the Digital Identity.

The Digital Identity system has seen some good uptake recently, with more than 8.7 million individuals on the system as at July 2022 (Hendry 2022), up from over 6 million as at December 2021 (Robert and Hume 2021). However, a key barrier to further uptake is the limited uses of the Digital Identity, which is currently only able to be used as a way for individuals to verify their identity for selected services provided by the Australian Government, such as applying for a tax file number or updating business details and authorisations on the Australian Business Register (Australian Government nd). Increasing the number of uses for the Digital Identity will also create 'network effects' whereby more organisations accepting a digital identity will encourage more users to sign up, which will in turn encourage more investment by organisations to accept the digital identity (Shah 2022, p. 8).

Uptake could be encouraged by allowing State and Territory Governments to use the Digital Identity for services where they require identity verification (such as for driver's licence applications), as well as the private sector (such as for bank or utility account openings). The Australian Government could work with the Council

on Federal Financial Relations to improve access to its Digital Identity for State and Territory Government services. Draft legislation required to expand the Digital Identity system was discussed and published in 2021 (DTA 2022a; Robert 2021), though it did not progress far from this point. As of November 2022, the Australian Government has signalled an intention to renew its focus on the Digital Identity (Shah 2022). This could potentially include integrating the system with the myGov mobile app to provide access to an expanded set of federal services in one environment, which could also provide a channel for further links with state government services and the private sector (such as banking, transport and corporate services) (Burton 2022b).

Avoiding duplication of identity verification systems is also important, as having multiple systems would hinder the consumer experience and limit the efficiency gains from a centralised system. The NSW Government is developing the NSW Government Identity Strategy, which has already rolled out digital driver's licences and will explore the NSW digital identity separate from the federal system (NSW Government 2021). It is important for the Australian Government to prioritise expansion of the digital identity system — and where possible learn from the experiences of New South Wales — so that it can be used for State and Territory Government services to avoid a proliferation of systems. The Australian Academy of Technology and Engineering has noted that different approaches across jurisdictions can lead to inefficiencies:

When a new digital initiative commences it is important to undertake a systematic review of existing standards. However, this does not always occur ... [for example,] digital driver's licenses in different jurisdictions. Application of existing standards will help minimise reinvention, ... helping create nationally consistent approaches. (ATSE, sub. 89, p. 4)



Recommendation 4.2

Expanding use cases for the Australian Government Digital Identity

The Australian Government, working with the Council on Federal Financial Relations, should increase access to its Digital Identity so that State and Territory Government services that require identity verification (such as applying for a driver's licence) and private sector services that require identity verification (such as opening a bank or utility account) are able to use the system, with appropriate access controls and safeguards.

Governments should work towards adopting a single national digital identity, rather than different jurisdictions having fragmented identity systems that require citizens to verify their identity with governments and businesses through different channels.

Cross-sector data sharing policies

Broader data legislation and policy settings can also support collaboration and integration — or prevent it. One example is the CDR: as discussed above, its expansion into open finance will include not only private sector data but also customer-specific data held by government. The recent strategic assessment found that:

Prioritising the inclusion of customer data held by governments recognises that most consumer milestone events or decisions (for example, buying a house, getting married, having a child, starting or winding up a business, or retiring) will involve a mixture of data held by private business and government agencies about an individual or business.

... expansion to government datasets and the inclusion of government agencies as both data holders and accredited data recipients has the potential to improve private sector goods and

services, support improved Government service delivery, and support Australians and Australian businesses across all facets of their lives and operations. (Treasury 2022b, p. 9)

On the other hand, the *Data Availability and Transparency Act 2022* (Cth) (DAT Act) does not currently allow for government data to be shared with the private sector, including businesses and not-for-profit organisations (box 3.1). This limits the ability for the data to be used for productivity- and welfare-enhancing purposes, such as for policy and research or to improve products and services.

For example, some not-for-profits that deliver local community services on behalf of the government have observed that more data sharing and government–private sector collaboration, such as via the Act, would enable them to improve program delivery and community outcomes (Sier 2022). The review into Australia’s response to COVID-19 highlighted the importance of data sharing between the government and private sector in enabling the policy response, and recommended that private sector researchers should be allowed to access public sector data under the scheme subject to accreditation and other controls (Shergold et al. 2022, p. 65). And participants to this inquiry submitted that more access to government data by researchers, not-for-profits and data intermediaries, in a secure and trusted framework, can improve our understanding of and policy response to national challenges such as population ageing, disaster prevention and recovery, energy security and First Nations community issues (ATSE, sub. 89, p. 3; Seer Data and Analytics, sub. 139, pp. 3–4).

Sharing government data with businesses can enable improved products and processes, better business decisions and innovation (PC 2017a, pp. 106–108). For instance, retailer Best Buy has used government demographic data to develop a market segmentation strategy based on customised consumer profiles, while in the health sector, Propeller Health created a GPS-enabled tracker that monitors inhaler usage by asthmatics from data supplied by the US Centre for Disease Control and Prevention to improve patient outcomes (Chui, Farrell and Jackson 2014, p. 10). And the Commission has previously noted that superannuation member outcomes — for those in retirement or transitioning to retirement — could be improved by using higher quality public data to develop and price super fund products (PC 2018, p. 240).

The DAT Act does not currently allow private sector access because of the desire to balance increased data use against privacy and security concerns (ABS, sub. 127, p. 12). Therefore, any expansion of the DAT Act to allow private sector participation should be done gradually and with appropriate safeguards. This could, for example, include a staged implementation, whereby access is first made available to accredited private sector organisations using the data for policy and research purposes to achieve social objectives, before the scheme is eventually opened for businesses to use commercially. And in terms of the appropriate safeguards, the BSA Software Alliance observed that the DAT Act’s existing accreditation framework for data access already allows the government to make risk-based decisions on whether an entity can meet the security and data-handling measures required to safely use the data, and that this framework could be applied to businesses and not-for-profit organisations as well. In addition, they noted that government can explore new privacy-enhancing technologies such as ‘homomorphic encryption, differential privacy techniques, and federated machine learning [to] create opportunities for further sharing data while preserving individual privacy’ (BSA, sub. 134, p. 3).

Another approach that has been applied in other countries to improve data sharing and use between governments, companies and researchers is data labs — ‘agile implementation units with cross-functional expertise that focus on specific use cases. Solutions are rapidly developed, tested, iterated and, once successful, rolled out at scale’ (Domeyer et al. 2021, p. 9). For instance:

- in the United Kingdom, the Ministry of Justice’s Justice Data Lab gives organisations access to the government’s administrative data on criminal reoffending, enabling research on specific questions about risks and rehabilitation (GovLab 2017b; MoJ 2018)

- in the United States, the California Policy Lab connects government agencies with academic researchers to answer specific policy questions using California's administrative data, such as how to reduce drug-related rule violations in the state's prisons (California Policy Lab nd; GovLab 2017a).

This cross-disciplinary data sharing and use is particularly suited to solving complex economic and social problems, such as those relating to the criminal and justice system per the above examples. The Commission has previously observed that supporting prisoner release via 'throughcare' — 'rehabilitation and reintegration aimed at helping inmates overcome a range of complex needs and return to society... coordinated to ensure offenders' needs are identified and the right supports are provided' (PC 2021a, p. 88) — would help to reduce reoffending rates. As the necessary supports span a range of government portfolios and community service providers (including in justice, healthcare, housing and employment services), sharing data between relevant agencies and private organisations would assist in implementing throughcare programs.



Finding 4.12

Data sharing between public and private sectors has productivity benefits

Collaboration between government and the private sector can lead to new opportunities for digitisation and data sharing, and derive more value from data provided to government agencies. Enabling government data sharing can benefit businesses and consumers by streamlining processes and improving service delivery, but only if data safety and security are maintained. The *Data Availability and Transparency Act 2022* (Cth) does not currently allow government data sharing with the private sector, which could prevent some high-value data uses.



Recommendation 4.3

Private sector access to government data

The Australian Government should enable government data to be securely shared with the private sector, so that not-for-profit organisations and businesses can undertake research and develop improved products and services for Australians.

This could be enabled by extending the *Data Availability and Transparency Act 2022* (Cth). Extension could be gradual, starting with accredited private organisations using the data for policy and research purposes to achieve social objectives, before being opened for accredited businesses to use the data commercially. Appropriate safeguards should be employed to ensure security and privacy concerns are addressed, and the government could consider utilising advances in technology for individual privacy preservation.

More value from data held by government-funded service providers

Opportunities for government-initiated data sharing extend beyond the data that is directly collected by government agencies. Governments fund various investments and services that generate potentially valuable data in their delivery. Even though much of this data is produced and held by service providers and users, data that is predominantly funded by taxpayers should be available for use in generating value for the community, subject to privacy and security protections.

Healthcare case study

Healthcare data is a good example of this, as the Australian Government provides significant subsidies for Medicare-funded health services and medicines on the Pharmaceutical Benefits Scheme. The potential productivity benefits of greater healthcare data sharing and use are well established, and can primarily be grouped into two categories (PC 2017a, pp. 522, 531):

- *improved service quality for the patient.* Sharing data between healthcare practitioners means that it is quicker and cheaper to access accurate medical records and transfer these between practitioners, leading to better healthcare decisions and reduction in low value care. Individual consumers recognise these benefits exist: the Consumer Policy Research Centre submitted that Australians ‘largely want health care providers to have the information they need to provide quality care ... 80% are ready to share their health data in a digitally enabled health system’ (CPRC, sub. 115, p. 7)
- *more informed health policy, funding allocation and service delivery.* Policymakers, researchers and service providers would have access to more accurate population health data and be able to better measure health system outcomes. This could be used, for example, to improve the identification of the causes of disease and at risk populations. Greater visibility over outcomes could also inform the evaluation of various approaches to service delivery (and the efficiency and effectiveness of these), enabling improvements and funding decisions that would potentially help service providers to deliver quality care to more consumers.

Appropriate consideration should be given to the types of healthcare data that could be shared with and/or through government in order to achieve these benefits. For example, improving individual healthcare decisions and quality of care may require sharing data such as prescribed medicines and pathology test results, so that patients can experience relatively seamless care across different practitioners and avoid the need to repeat tests or risking prescription errors. In contrast, to achieve broader research and policy benefits, this type of patient-specific information is unlikely to be required. De-identified data about service use and outcomes linked across different parts of the health system (for instance, whether a patient who saw a GP was treated or had to subsequently engage with specialists or hospitals) might be more useful.

The benefits of data sharing must also be balanced against safety and privacy concerns. For example, even though the government provides significant funding for healthcare, their right to data from publicly funded health services may not include written medical records created by a practitioner. These are covered by both copyright and privacy laws, with patients having some rights to access the records. However, it is far from clear that government access to these records (at this time) would create social benefits that outweigh the costs — including the costs of practitioners potentially reducing the amount of useful information they include in these records.

The Australian Government’s My Health Record (MHR) initiative is intended to provide a mechanism for collating, storing and sharing consumer health information (box 3.4). However, despite increased uptake over recent years, MHR is some way off from being a comprehensive source of information on all healthcare services used by a consumer. This, in turn, limits the benefits that can be achieved for both individuals and the community.

Interoperability between the data collection and storage systems of different healthcare providers and data users has been an ongoing barrier to MHR take-up, including in the aged care sector. For example, a 2021 survey of residential aged care providers by the Aged Care Industry Information Technology Council found that 71% used

software that does not interface with MHR (Health Metrics 2021). More broadly, the Commission observed in its *Innovations in Care for Chronic Health Conditions* report that ‘many of the IT systems that GPs use are not interoperable with hospital IT systems, limiting communication and information sharing between these two sectors’ (PC 2021b, p. 118). In an environment where caregivers and medical practitioners are often time poor, the additional time required to navigate systems that do not interface with other data sources — or to change their system to enable interoperability — can be a significant barrier to better data use.

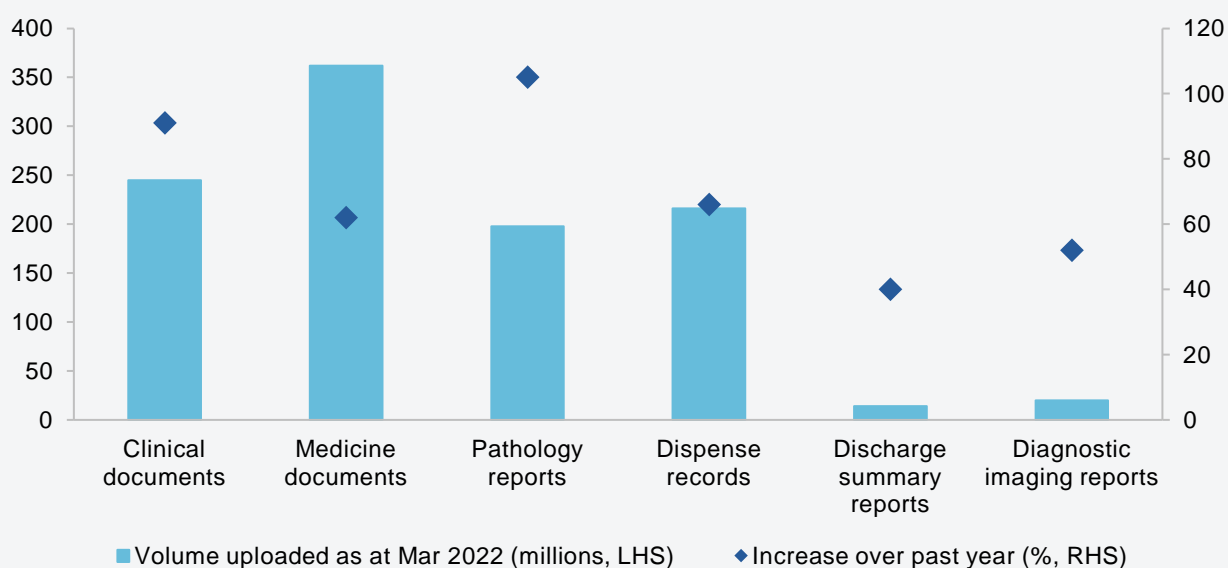
Box 3.4 – Use of My Health Record

The Australian Government introduced My Health Record (MHR) in July 2012 to improve consumer health data sharing. Initial uptake of MHR was slow, as it was opt-in until January 2019 and many medical practitioners and software providers were not well prepared to use MHR. In MHR’s early years, slow uptake begat slow uptake as ‘low usage throughout the healthcare system reduced the incentive for individual clinicians to use MHR. For example, patchy usage by [general practitioners (GPs)] meant that hospital staff saw little value in using MHR and vice versa’ (PC 2021b, p. 119).

Since MHR was changed from opt in to opt out, the number of records with data has increased substantially, from 5.4 million people in January 2019 to more than 22.5 million in March 2022 (ADHA 2022). These records include 245 million clinical documents (such as those uploaded by hospitals, pathologists and radiologists) and 362 million medicine documents (such as those uploaded by GPs and pharmacists), with the volume of uploaded documents increasing by more than 50% over the past year for most document types (figure below). Early feedback from medical practitioners after the shift to an opt-out approach was mixed, with the Royal Australian College of GPs observing in July 2019: ‘has Australia’s digital health repository hit the threshold for usefulness? Some GPs give an emphatic yes, while others say it is still a work in progress’ (Hendrie 2019). The continued growth of data stored in MHRs is likely to have increased its usefulness to consumers and service providers.

Data in My Health Record has increased significantly

Volume of documents uploaded by document type, March 2022



Source: ADHA (2022).

Box 3.4 – Use of My Health Record

However, despite the increased uptake, MHR is some way off from being a comprehensive source of data on all healthcare services used by a consumer. In addition to individuals being able to opt out, healthcare providers can also choose not to enter consumer data into a MHR, even if the individual has opted in. As such, the amount of detail contained within individual MHRs is variable; for example, although 99% of GPs are registered on the system, GPs report that one in 25 MHRs currently contain no data at all (Attwooll 2022).

Registration and usage is still low in parts of the system: as at March 2022, only 22% of specialists are registered on MHR and 10% have used it (ADHA 2022). And only 10% of residential aged care facilities were registered as at April 2021, with only 3% having used it (Cheu 2021). Given the potential benefits of consolidating health data for aged care residents, the Aged Care Royal Commission recommended 'universal adoption by the aged care sector of digital technology and My Health Record' by July 2022, including that all providers use a digital care management system that is interoperable with MHR (Pagone and Briggs 2021, p. 253).

There have been efforts to improve health data collection, sharing and interoperability outside of MHR.

- The Australian Government's Practice Incentives Program Quality Improvement (PIP QI) Incentive pays GPs up to \$50 000 per year to collect and submit data about specific improvement measures to their local primary health network (PHN). The data is used to 'benefit patients directly at the practice level and to inform PHN regional planning and contribute to national health policy' (Department of Health 2019, p. 5). The Commission has previously reported 'mixed views from stakeholders on the PIP QI. Some considered it has encouraged practices to improve their data collection ... However, others argued the data requirements were too low and would not lead to substantial improvements in quality of care' (PC 2021b, p. 150). The Practice Incentives Program also has a specific eHealth Incentive (ePIP), which rewards GPs that meet certain digital health requirements such as having an electronic secure messaging capability, sending the majority of their prescriptions electronically and using compliant software to participate in the MHR system (including uploading a minimum number of shared health summaries each quarter) (ADHA nd).
- Some states and territories have implemented health data initiatives in their own jurisdictions.
 - In Queensland, all referrals from GPs to public hospital specialists are made electronically through the Smart Referrals initiative, which was established under the 2016 *Specialist Outpatient Strategy* (Queensland Health 2016) to improve follow-up care, lower wait times and reduce human error. Digital referrals are integrated with existing GP software and can be tracked across the state.
 - In New South Wales, the Lumos program links GPs' primary care data with other health system data such as from emergency departments, hospital admitted patients, non-admitted patients and ambulances. It became a state-wide program in 2020 and, although not all GPs are on board, over 500 practices from across all 10 NSW PHNs are participating (NSW Health 2021).
 - In the Northern Territory, the Chronic Conditions Management Model requires all NT Health clinics to upload consumer data in electronic records. The data is cleaned and turned into automated reports that are provided back to practitioners to inform subsequent decisions about preventing and managing chronic health conditions (PC 2021b, pp. 123–124).
 - In Victoria, the Health Legislation Amendment (Information Sharing) Bill 2021 (Vic) seeks to establish a centralised electronic database for hospitals, ambulances and other healthcare providers to share patient data (Parliament of Victoria 2021). It would be mandatory for data to be shared in the database

(that is, patients are unable to opt out), which medical practitioners have noted is an important feature for generating benefits for patients and the broader system, and that 'the benefits outweigh the [privacy] risks' (Estcourt and Eddie 2022).

While these have improved data use, individual initiatives that only cover parts of the health system or particular jurisdictions are not sufficiently comprehensive or interoperable to result in increased service quality for all consumers, or enable more informed health policy development and resource allocation on a large scale. The Australian Healthcare and Hospitals Association submitted that past efforts to bring together primary healthcare data had similar limitations: 'in the absence of a national minimum dataset for primary healthcare, none [of the previous initiatives] have been comprehensively successful' (AHHA, sub. 27, att. 1, p. 16). And Bupa observed that to incentivise best practice in healthcare, 'we need to accelerate implementation of strategies for increased interoperability of health data. To improve service planning and outcomes it is essential that more data of higher quality is made available across both the public and private systems' (Bupa, sub. 69, p. 11).



Finding 4.13

Data from government-funded services could be better used

Much of the data generated by government-funded services and investments is not currently shared. But there could be large benefits resulting from better use of this data, subject to appropriate data security and privacy safeguards. For example, in health, data sharing can lead to improved services as providers have access to more accurate medical records and policymakers make more informed decisions.

Building on current foundations to improve health data sharing

The government should support more health data sharing, given the potential benefits that can be realised from greater use of this data and the significant policy levers that the government controls in funding and delivering health services. MHR could be a starting point for this — while it is currently not a complete source of health data on an individual patient (box 3.4), the underlying MHR infrastructure (including governance and security settings) can provide the foundation for a system in which data is shared more comprehensively and used to improve patient and sector-wide outcomes. Several government actions would encourage increased health data sharing using MHR, building on its current foundations.

First, there should be more clarity about opting out of MHR participation and what this entails for patients and practitioners. While patients have the right to opt out, the government should clarify that practitioners are required to upload relevant health information to MHR for patients who have not opted out of participating. The definition of 'relevant' information should be determined by government in consultation with patients and practitioners, and should be based on what information is most beneficial for informing patient care and enabling practitioners to improve health service delivery; for example, pathology and diagnostic imaging results and prescribed medications. Given that patients who have opted out of MHR could be missing out on significant improvements in the quality of the health services they receive, they should be required to confirm their decision to opt out each year after discussing with their GP.

Second, the government should support initiatives that make it easier for practitioners to upload information to MHR. Different healthcare practice management software has different functionality in how patient information can be entered and used, and not all software is integrated with the MHR system.

- In the short term, the government could publish a list of available software that can directly interface with MHR; for example, by allowing practitioners to automatically upload data to the MHR system when it is entered into a patient's record at the practice. This will enable practitioners to easily identify which software options could provide a more streamlined approach to interacting with MHR, and minimise unnecessary administrative burdens. The Australian Digital Health Agency (ADHA) already publishes a register of medical software products that conform with ePIP requirements (discussed above), including MHR-compatible software (ADHA 2021). This could be expanded to software that is used by other types of healthcare practitioners (as ePIP is a GP-only program), and with additional information about software features — the ATO's register of STP-compliant products, which is discussed above and includes details about each product's functionality and target market, could be a useful example to follow. Incentives to migrate to MHR-compliant software products could be considered for other healthcare practitioners beyond GPs, who can already benefit from ePIP.
- In the medium term, the government can address the broader interoperability issues in health data collection and storage (discussed above) by setting conformance standards for all medical practice software providers. These standards should require that practitioners can automatically upload relevant records to MHR via the software, and allow them to extract their patient data in an easy-to-use format to enable analysis at the practice level and transfer between software providers. The standards should also cover a consistent language and terminology, and a secure gateway to enable practitioners using different software to connect with each other. This could build on work already underway by the ADHA in developing 'terminology and information exchange standards to support the interoperability of digital health systems' (ADHA, sub. 145, p. 2).

Third, while MHR is already a secure environment for sharing patient data and is managed according to the Australian Government Protective Security Policy Framework, trust and confidence in the system can only be maintained if these security settings are continually monitored and updated. The government should review MHR's security measures on an ongoing basis to ensure that they remain fit for purpose in a rapidly evolving security threat environment.

The ultimate goal is to have a MHR system that allows comprehensive and seamless sharing of relevant health data between all practitioners that are providing care for an individual patient, as well as empowering patients by enabling them to access their own complete health record. Implementing the above steps would get some way towards this end goal: the benefits to patients and practitioners are significant, the system safeguards would be in place, and enhanced software functionality would reduce barriers to participation.

But there may be some practitioners that would still not be willing or able to upload patient information into MHR (for example, those that do not use practice management software and maintain paper records). This final 'tail' of practitioners may require some additional education and assistance and, as a last resort, compulsion to share relevant information for the benefit of their patients, particularly for service providers that receive government funding. For example, there have previously been suggestions that government could mandate that some health information be uploaded into MHR, ranging from pathology and diagnostic imaging results (Attwooll 2022) to patient outcomes and service provision data from all practitioners receiving government funding (AHHA, sub. 27, att. 1, p. 18). Given that buy-in from both practitioners and patients is an important factor underpinning use of and trust in MHR, mandating data sharing should be considered by the government as a last resort in weighing up the benefits and costs of system use.

The requirement to make healthcare data available to other practitioners and patients may change the nature of that data. Survey evidence from US mental health practitioners suggests that, when patients are given open access to their medical records through the OpenNotes software package, physicians change the tone and reduce the detail of their notes (Moll and Cajander 2020). And in Sweden, psychiatric care practitioners were found to be less candid with their notes (Pettersson, Erlingsdóttir, and others 2018) and

oncology professionals noted changes to documentation practices, though this did not appear to have sizable negative effects on patient outcomes (Dobscha et al. 2016). Conversely, a review of empirical studies did not suggest that increased patient access to records through OpenNotes induced substantial changes to medical records (Blease, Torous and Hägglund 2020, p. 3). This indicates that the effect of more health data sharing on medical records (and patient outcomes) is, at best, unclear. However, as the requirement to share some healthcare data with patients may interact with documentation practices and therefore treatment (for example, where mental health records may themselves lead to patient trauma), there may be a small set of health records that require special conditions for sharing through MHR.

Finally, while the above discussion about implementation has focused on using MHR to improve service quality at an individual patient and practitioner level, the data in the MHR system could also be used to inform health policy and service planning, and disseminate best practice across the health sector. For example, data from primary care providers can help to 'facilitate increased efficiencies in care delivery, create more proactive preventive interventions, identify at-risk populations, inform health strategy and planning, support quality-improvement initiatives in Australian general practice and support judiciously targeted investment' (RACGP 2022, p. 19). The ADHA submitted that the size and quality of the MHR database means that 'it is a powerful resource to identify, support and monitor progress in vulnerable communities and cohorts ... provid[ing] a more holistic view of patient's lives and support[ing] the identification of structural, social, economic, and cultural determinants of health' (ADHA, sub. 145, p. 6).

Using MHR to inform service planning and policy development would require a broader framework, as it is currently used for sharing individual patient records and the system's governance and safeguards are set up for that purpose. This would require extensive consultation with practitioners and the community on how the data could be de-identified and analysed for policy and planning purposes, in a way that maintains individual trust in MHR while also benefiting the broader system. For example, the Office of the Australian Information Commissioner has produced guidance on de-identification in collaboration with the CSIRO's Data61, and noted that 'appropriate de-identification may be complex, especially in relation to detailed datasets that may be disclosed widely and combined with other datasets' (OAIC, sub. 173, p. 5). Following the analysis, system-level benefits may then lead to further benefits at the individual practice and patient level, if the analysis was able to be fed back to the practice and re-linked to patients. This could involve retaining the linking identifier at the practice level to preserve anonymity in the system-level analysis.

Beyond healthcare

The rationales discussed for healthcare data apply more generally for increasing data sharing from other government-funded investments and services in sectors such as school education, childcare, aged care, criminal justice, community services and infrastructure contracts. In each case, the government would need to meet legitimate privacy and security concerns held by individuals and ensure that private data collection is not undesirably distorted by the data sharing initiative.

Large productivity and welfare gains could potentially result from better use of the data produced in each of these areas. As in the case of healthcare, these include benefits to individual consumers from improved service quality, and system-wide improvements arising from more informed resource allocation and research and policy development. One example of individual benefits is that sharing and linking service use data held by government-funded community services providers in areas such as housing and employment services could help to provide released prisoners with appropriate supports upon their return to the community. And at the system level, greater availability of data on childcare and education outcomes can help to inform policy decisions about funding allocation and effective service delivery.

Healthcare should therefore be only the starting point for the government in supporting more data sharing by government-funded service providers, to enable linked and seamless service delivery in other sectors. Depending on the sector and the existing (public and private) settings in place for collecting and using data, the government could play useful roles such as identifying relevant data to be shared and linked to benefit individuals, or setting technical standards for data sharing to promote interoperability — as suggested above in health. There may also be opportunities for government to use its funding levers to incentivise service providers to gather and share new data that could facilitate improved service delivery and productivity, such as data on service quality that is not currently collected.



Recommendation 4.4 **Sharing data from government-funded services**

The Australian Government should increase the safe sharing and use of data collected by government-funded service providers, including community, not-for-profit and private organisations. This would include identifying relevant data that could be safely shared and linked to benefit individuals receiving services, setting technical standards for data sharing to promote interoperability, and using funding levers to incentivise service providers to gather and share data that could improve service delivery and productivity.

Healthcare data should be targeted in the first instance to enable wellbeing benefits for individuals and productivity benefits at the practitioner and system levels. This could be implemented using My Health Record (MHR) as the foundation for a comprehensive data sharing system, and include provisions for:

- **opting out of the system:** Where consumers have not exercised their right to opt out of the system, practitioners should be required to upload agreed relevant health records to MHR. Patients that opt out should be required to confirm their decision each year after discussing with their general practitioner
- **health software compatibility and standards:** In the short term, the Australian Government should publish a register of health practice software that is integrated with MHR. In the medium term, it should set conformance standards that require all health practice software to be compatible with MHR to enable ready uploading of relevant records to MHR and extraction of patient data in an easy-to-use, secure and transferable format. The standards should also include consistent language and terminology, and a secure gateway to enable practitioners using different software to connect with each other
- **de-identification to support system planning:** The Australian Government should, in consultation with healthcare practitioners and the community, develop a framework for using the data in MHR in a de-identified way for health system-wide planning and policy development.

To support seamless service delivery, safe sharing of data held by government-funded service providers outside of healthcare — such as school education, childcare, aged care, criminal justice, community services and infrastructure contracts — should also be investigated and facilitated by the Australian Government.

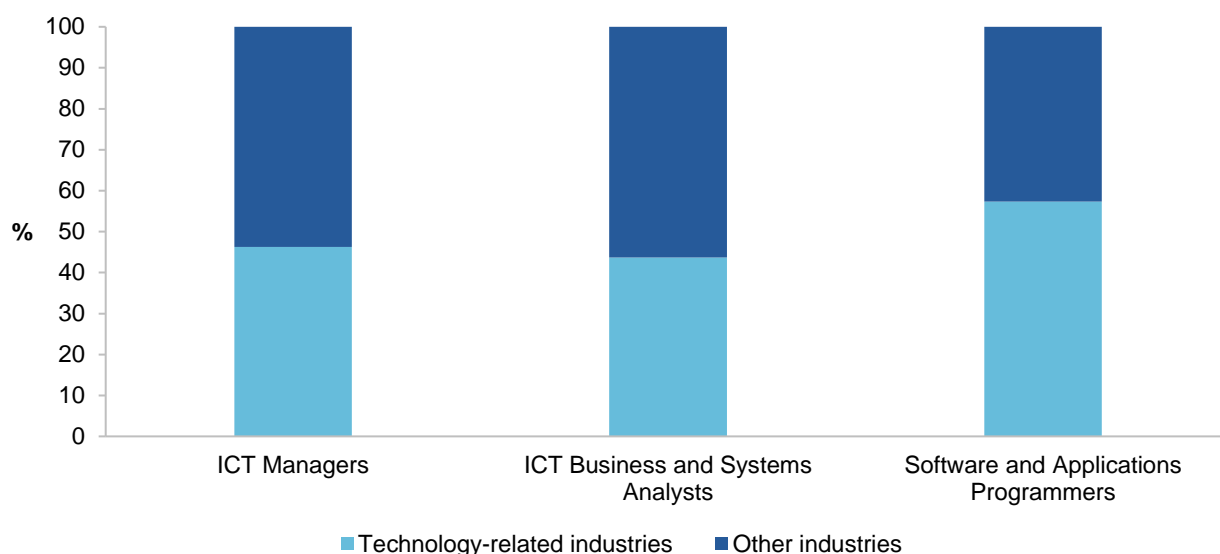
3.3 Developing digital, data and cyber security skills

Demand for specialist digital and data workers is high across the Australian economy, not just in the technology sector, as ‘digital skills is one of the most important drivers of future prosperity’ (ATSE, sub. 8, p. 2). While the reported size of the ‘tech workforce’ in Australia varies depending on the occupations that are classified as working in digital and data-related roles, several industry associations have estimated that there are now over 800 000 workers employed in ‘tech jobs’ (ACS 2021a; TCA 2022). This includes highly

technical workers such as software developers and data scientists, as well as roles that support the adoption and experience of digital and data-related services by others (such as business analysts, technology product managers and user experience designers).

Many of these specialist workers are not employed by technology companies, or even consultancies that advise on digital and data solutions, but instead by businesses in other industries. For example, in the 2021 Census, less than half of all ICT managers and ICT business and systems analysts worked in the technology-related industries of information media and telecommunications or professional, scientific and technical services (figure 3.5). About 40% of software and applications programmers were employed outside these industries.

Figure 3.5 – Many technology workers are employed in other industries
Share of workers in selected ICT occupations employed in technology-related industries, 2021^a

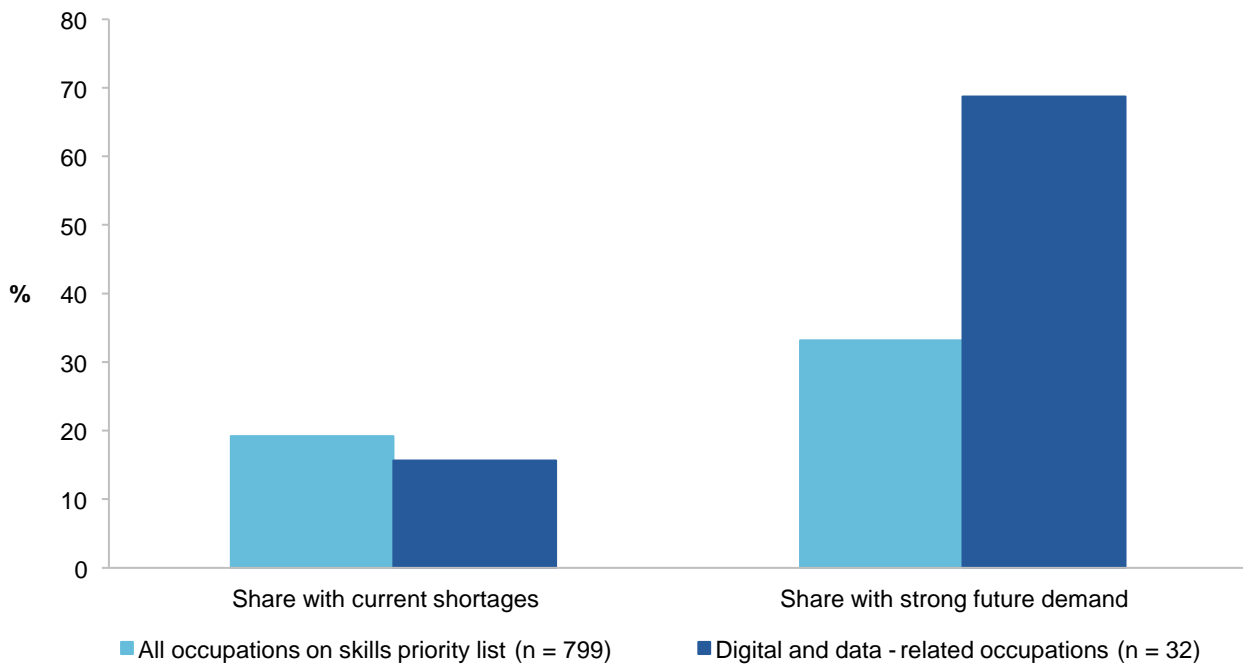


a. Technology-related industries are the ‘information media and telecommunications’ and ‘professional, scientific and technical services’ industries.

Source: ABS (*Population Census, 2021*).

As the Australian economy becomes increasingly digitised — a trend accelerated by the COVID-19 pandemic — demand for these specialist digital and data workers is expected to grow. In 2021, technology occupations on the then-National Skills Commission’s (NSC’s; now Jobs and Skills Australia) skills priority list were more than twice as likely to have ‘strong’ expected future demand in the next five years compared with the forecasts across all occupations on the list (figure 3.6). Industry also expects rapid growth in labour demand, with the Australian Computer Society forecasting that there will be demand for 1.2 million technology workers by 2035 (ACS 2021b, p. 6) and the Tech Council of Australia targeting technology employment of almost 1.3 million workers by 2030 (IA 2022a, p. 2).

Figure 3.6 – Strong future demand is projected for digital and data-related jobs
Share of occupations on the NSC’s skills priority list with high current and future demand, June 2021^{a,b}



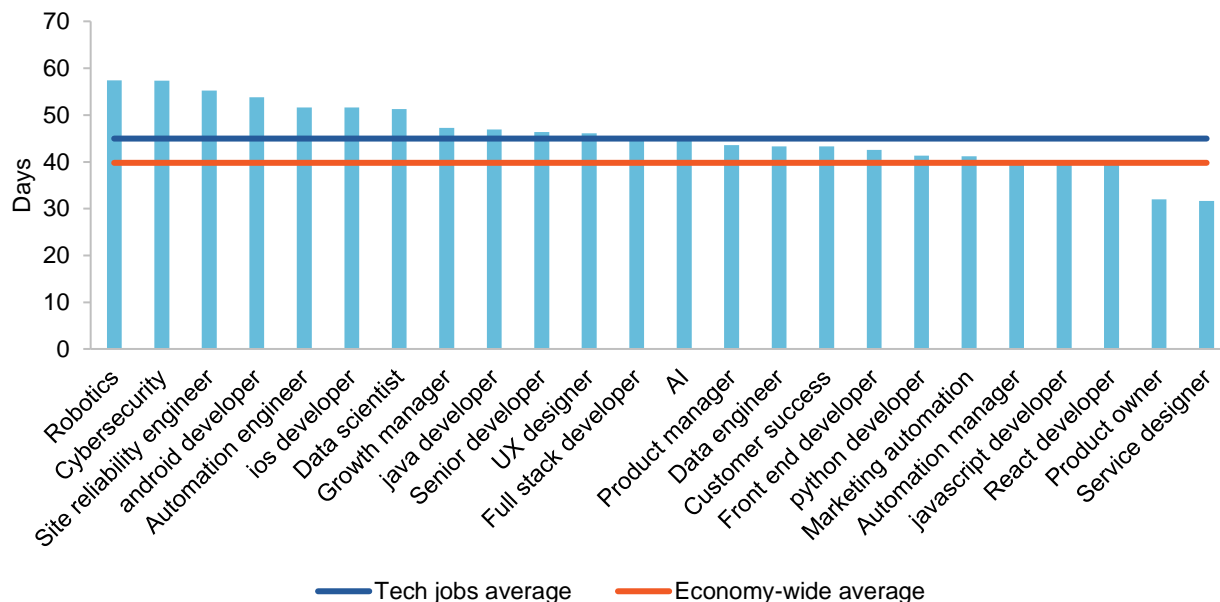
a. The skills priority list includes occupations at the 6-digit ANZSCO level. The 32 occupations included as digital and data related are: Chief Information Officer, ICT Project Manager, ICT Trainer, ICT Account Manager, ICT Business Development Manager, ICT Sales Representative, ICT Business Analyst, Systems Analyst, Multimedia Specialist, Web Developer, Analyst Programmer, Developer Programmer, Software Engineer, Software Tester, Database Administrator, ICT Security Specialist, Systems Administrator, Computer Network and Systems Engineer, Network Administrator, Network Analyst, ICT Quality Assurance Engineer, ICT Support Engineer, ICT Systems Test Engineer, Telecommunications Engineer, Telecommunications Network Engineer, Hardware Technician, ICT Customer Support Officer, Web Administrator, Radiocommunications Technician, Telecommunications Field Engineer, Telecommunications Network Planner, and Telecommunications Technical Officer or Technologist. **b.** Future demand is based on the NSC’s five-year employment projections, which combine forecasts from autoregressive integrated moving average and exponential smoothing with damped trend models, with known future industry developments and other NSC research.

Source: NSC (2021a).

The skills priority list reported that the share of technology occupations in current shortage was broadly similar to the overall list in 2021. Analysis by the Tech Council of Australia using job ads data from Indeed, an online job search platform, suggests that the average age of open technology job ads (at 45 days) is higher than the economy-wide average (40 days). There are some particularly specialised roles that take longer to fill — such as in robotics, cyber security and niche engineering and developer roles (figure 3.7). In stakeholder engagement undertaken by the NSC, employers experiencing current challenges hiring relevant digital and data skills stated that:

...where there was recruitment difficulty, this was experienced nationally, and that particular difficulty was experienced recruiting for experienced positions. Reported recruitment difficulty was most often attributed to the lack of technical skills or qualification of applicants, a lack of suitable or experienced applicants, or the specialised nature of roles. ... The most frequently mentioned challenge facing recruitment in these occupations in the future is the lack of a locally trained workforce. (NSC 2021b, p. 5)

Figure 3.7 – Specialist digital and data roles take longer than average to fill
Weighted average age of open job ads, 30 September–1 October 2021^a



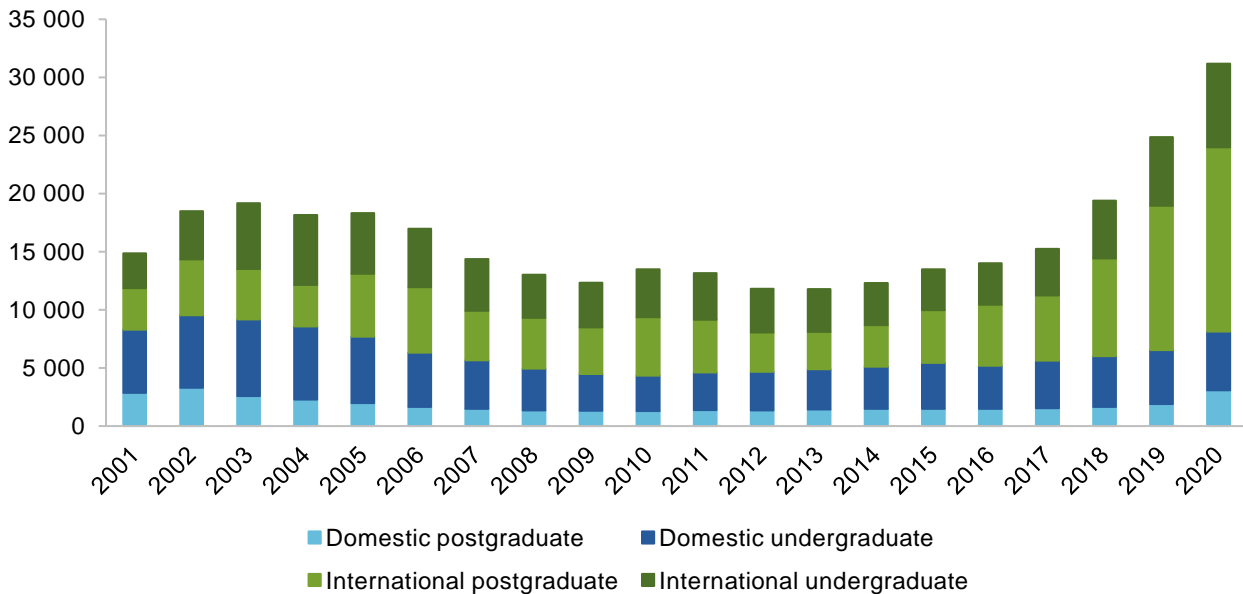
a. This analysis by the Tech Council of Australia used job ads data from online job search platform Indeed. The number of open ads was collected for each job and segmented based on days since posting (7, 28, 56, 84, 102, 130 day buckets). The weighted average age was calculated by multiplying the share of job ads open within a particular time bucket by the midpoint between the minimum and maximum days of that bucket.

Source: Tech Council of Australia (pers. comm., 31 May 2022).

Specialist digital and data skills from formal education and training

Universities provide one pathway for digital and data skills development, and information technology (IT) degree completions have steadily increased over the past decade, rising particularly strongly in recent years (figure 3.8). While IT degree completions have increased for both domestic and international students, the latter group experienced significantly faster growth, with an average annual growth rate of 27% between 2016 and 2020 (compared with 12% for domestic students). As the latest available data on university degree completions predates the greatest disruptions caused by COVID-19, the pandemic's total impact on IT degree completions by international students remains to be seen.

Figure 3.8 – IT university degree completions have increased over the past decade
IT university degree completions by qualification level and citizenship category, 2001 to 2020^a



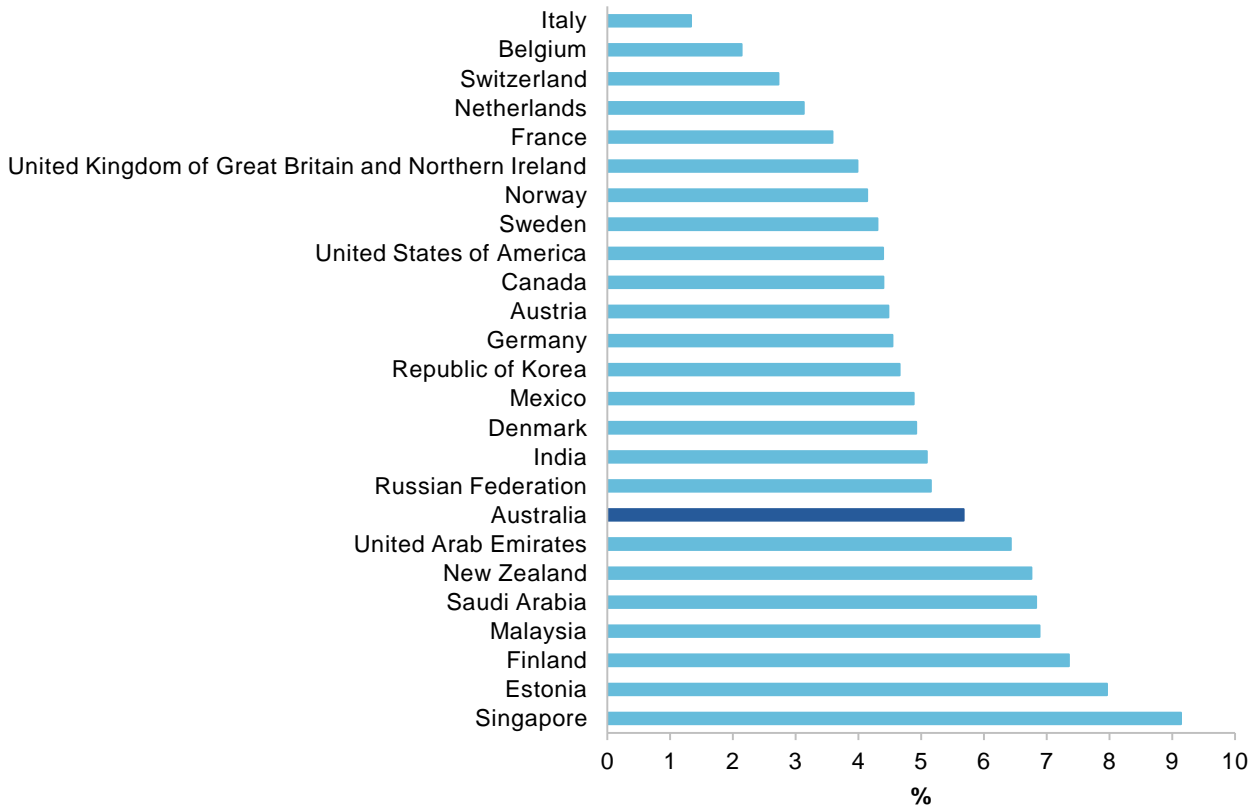
a. The Department of Education, Skills and Employment changed the format of its completions data publication in 2020. Completions data for 2016 to 2020 is from the Award Course Completions Pivot Table, while data for 2001 to 2015 is from the Higher Education Data Cube (uCube).

Source: DESE (2021, 2022).

The share of IT university graduates in Australia is relatively high compared with many other countries, with 6% of tertiary education graduates completing studies in information and communication technologies — higher than in the United States, United Kingdom, Canada and various European countries (figure 3.9). However, this does not necessarily translate to a larger pipeline of specialist digital and data workers in Australia. Industry stakeholders observe that ‘approximately 1 in 2 of these international [IT] students do not permanently migrate to Australia, which means that our high enrolments overstate the impact that Australia’s universities have on training our tech workforce’ (TCA 2022, p. 5).

There have been approximately 20 000 annual completions of IT programs in the vocational education and training (VET) sector in recent years, with a growing share of these being international students (up from 10% in 2016 to 28% in 2020; figure 3.10). Post-study outcomes for students completing IT VET programs are relatively poor — in 2021, 73% reported that they were employed or in further study after completing their IT VET course, compared with 86% across all fields of education (NCVER 2022). However, students who are able to find employment in the technology sector after their VET studies perform relatively well, with the average wage gap between a VET qualification and a bachelor’s degree being only 3% for entry-level roles, compared with 15–17% for entry-level workers in alternative industries (TCA 2022, p. 10).

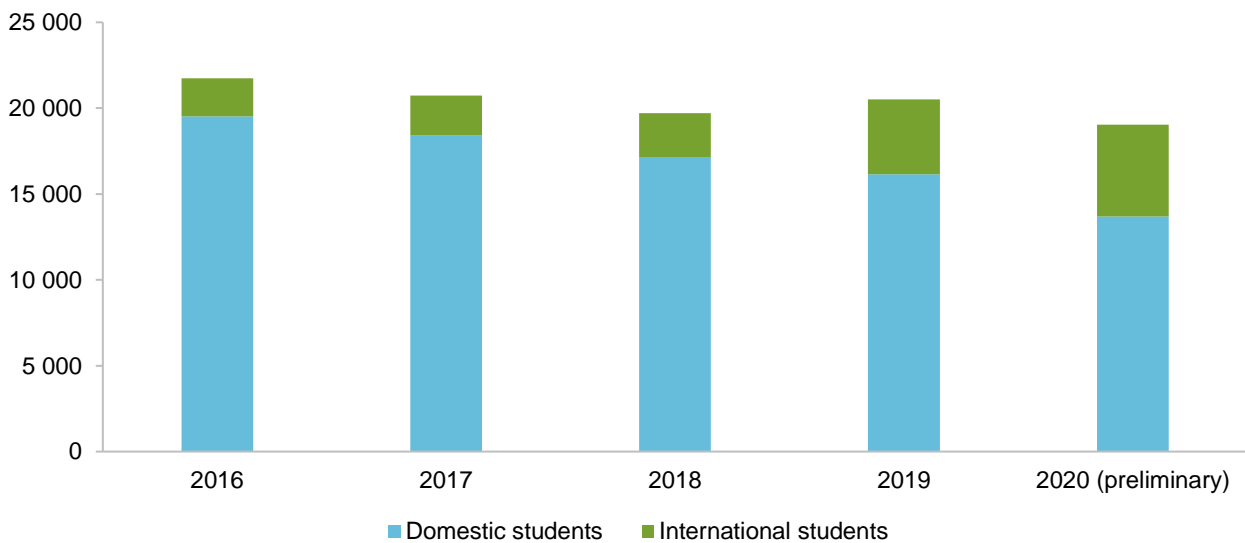
Figure 3.9 – Australia has a relatively high share of ICT graduates
Share of tertiary education graduates graduating from ICT programmes, 2019



Source: UNESCO (2021).

Figure 3.10 – Domestic IT VET program completions have declined, while international completions have increased

VET completions in the IT field of education by citizenship category, 2016 to 2020



Source: NCVET (2022).

Short courses for digital and data reskilling and upskilling

Not everyone seeking employment in technical digital or data roles wants to complete an undergraduate or postgraduate degree — for example, individuals who are already in the workforce might want to transition into a specialist technology job from an adjacent role, without spending years returning to study. Other, more flexible, methods for upskilling or reskilling are required so that these workers can fill gaps in their technical knowledge while continuing to utilise relevant capabilities developed through their prior work experience. The Tech Council of Australia has stated that ‘reskilling and upskilling workers must become the primary way tech jobs are filled’ in order to meet future demand for specialist technology workers (TCA 2021b, p. 3).

There are a range of reskilling and upskilling options available for workers to develop the specialist digital or data capabilities required to transition into a technical role. Alternatives to a formal full-length qualification are offered by various organisations, and enable workers to ‘obtain targeted skills or knowledge in a shorter timeframe and at a reduced cost relative to traditional tertiary education’ (ACS 2020, p. 35).

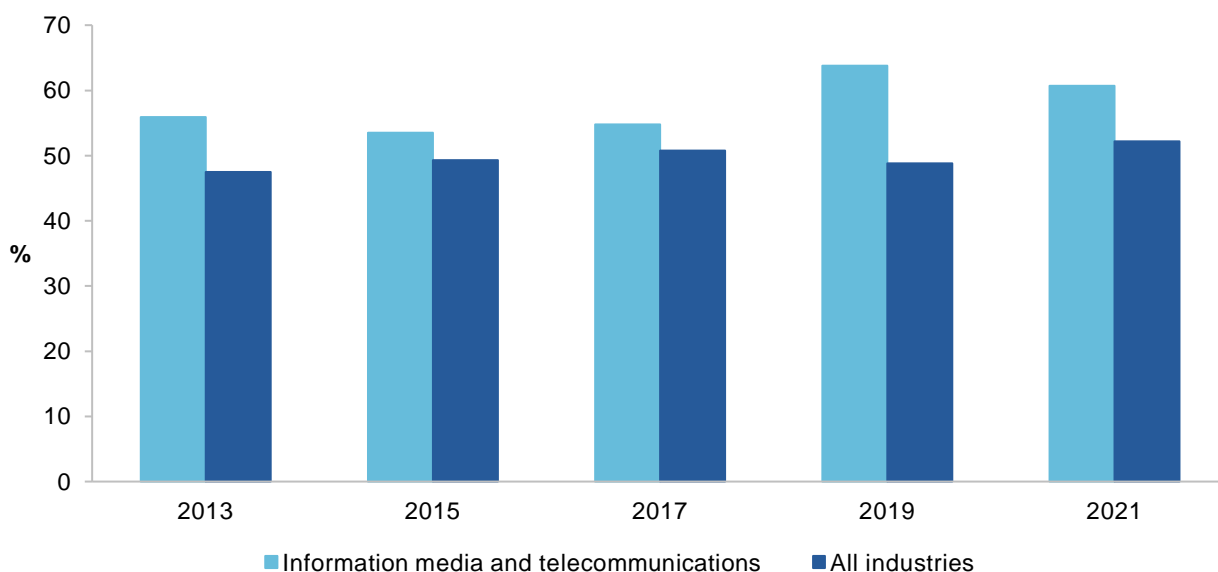
- Vendor certifications are provided by companies that offer software or data services to train users of those services. Examples include Cisco’s certifications across a range of technology categories (such as security, enterprise and DevNet) and levels (from entry level up to expert) (Cisco 2022); Microsoft’s 200+ certifications in areas such as its Azure cloud services and security solutions (Microsoft 2022); and Amazon’s certifications ranging from foundational Amazon Web Services cloud knowledge through to specialty domains in machine learning, advanced networking and databases (AWS 2022).
- Tertiary education institutions have set up separate entities that offer short courses targeted at developing specific digital and data skills. For example, RMIT Online has 6–16 week online courses to develop technical skills such as AI programming, app design and data analytics (RMIT 2022).
- Various learning platforms offer shorter courses for workers to develop technical skills. For instance:
 - Some companies deliver their own education and training courses in specialist digital and data capabilities, such as General Assembly’s immersive courses in software engineering, data science and user experience (General Assembly 2022) and Academy Xi’s online courses in digital product management, web development and data analytics (Academy Xi 2022)
 - Online education providers are collaborating with companies to offer new training options. For example, Google has partnered with Coursera to launch three professional certificates in data analytics, project management and user experience design, while Microsoft and General Assembly have a partnership to develop scalable AI training solutions (Coursera 2021; Microsoft 2019). Outside of big technology companies, Udacity has worked with AT&T and Shell to create tailored courses in ‘hard-to-source, in-demand skills sets’ such as web development and data science (AT&T) and artificial intelligence (Shell) (WEF 2020b, p. 48).

Women are more likely than men to enter the tech workforce through a reskilling pathway, by moving from another sector into a specialist technology role in their early to mid-career (TCA 2022, p. 5). In contrast, men are more likely to enter the tech workforce directly from education or training at the start of their career, and then move jobs within the sector. Greater use of these shorter and more flexible learning options to develop technical digital and data skills could therefore help to lift female participation in specialist technology roles, as only 1 in 4 workers in Australia’s tech sector are women (TCA 2022, p. 1).

Employers with digital and data skill needs can also prefer shorter-form learning options offered by industry providers, compared with the formal qualifications delivered by universities and the VET sector. Industry-delivered training — such as vendor certifications — are viewed by some employers as developing more relevant skills than the formal education system: employers state that these vendor training options are “focused and tailored”, “cutting edge”, “very relevant”, “highly flexible” [and] “great value for money” (Bowman and Callan 2021, p. 46). Shorter-form learning options could be particularly useful for SMEs — which are more likely to cite lack of skills as a barrier to technology adoption (section 2.1) — to build digital and data capabilities, as the financial and time costs of training are relatively high for these employers (OECD 2021, p. 10).

Surveys of IT industry employers routinely find that they are more likely to use unaccredited training than the average use across all industries (figure 3.11). And in 2021, 83% of employers in the information, media and telecommunications industry that used unaccredited training reported satisfaction with training to meet their skill needs, compared with only 58% of employers using nationally recognised training (NCVER 2021).

Figure 3.11 – Employers in the IT industry are more likely to use unaccredited training
Share of employers using unaccredited training in the past 12 months by industry, 2013 to 2021



Source: NCVER (2021).

The private benefits associated with these training options means that many are already being taken up by Australian workers and businesses. In addition to the private benefits, some governments have also introduced initiatives aimed at encouraging workers to upskill and reskill in digital and data using short training courses. For example, Victoria’s Digital Jobs program supports 5000 mid-career employees to undertake 12 weeks of industry-backed training, followed by 12 weeks of work experience in a digital role (DJPR 2022). At the national level, the Digital Skills Organisation launched a pilot project to train 100 data analysts, with participants undertaking short unaccredited training tailored to employers’ needs on digital and data skills, and funding incentives tied to training completion and employment outcomes (DSO 2021).

Several inquiry participants suggested that the government should provide further financial incentives for digital and data-related short courses — such as micro-credentials and ‘boot camps’— for upskilling and reskilling purposes (for example, Australian Investment Council, sub. 83, p. 7; BSA, sub. 134, p. 5; Engineers Australia, sub. 85, p. 14; UTS, sub. 92, p. 2). Government support for these types of courses and

lifelong learning among Australian workers more generally is discussed in the inquiry's companion volume *From learning to growth*, which recommends that the government could encourage uptake by trialling targeted policies for work-related upskilling and reskilling, and extending self-education tax deductions to education that is likely to lead to income outside of current employment. Existing programs designed to support lifelong learning, such as Employability Skills Training and the incoming Skills and Training Boost, should also be evaluated for their effectiveness at facilitating additional training.

Shorter-form and unaccredited training will not always be the most suitable option for workers looking to reskill or upskill into a technical digital or data role. RMIT Online, a provider of both short courses and full-length qualifications in various specialist digital and data areas, notes that 'while short-term training may be enough in many cases, if people are looking for a career change or a brand new, complex skillset, longer-term and structured education by a tertiary institution may be needed' (RMIT Online and Deloitte Access Economics 2021, p. 25). The most efficient channel for reskilling or upskilling will depend on an individual's previous education and work experience and the skills that need to be developed in transitioning to a new technical role.



Finding 4.14

Shorter-form learning options help develop digital and data skills

Short courses and unaccredited training can be preferred for developing digital and data skills, as they are often more relevant and flexible. Businesses and workers are already using options such as industry-delivered vendor certifications to upskill and reskill, and government support (such as through tax incentives) could further increase uptake where policies are targeted and evaluated for additionality.

Supplementing the local workforce with overseas experience

Not all skills gaps in specialist digital and data capabilities can be filled through education and training. The then-National Skills Commissioner previously stated that there can be a range of factors that result in demand exceeding supply for specific skills, particularly in the short term, including employers desiring:

... on the job experience, things that are difficult to provide through formal training alone; [or] a highly technical or specialised skill which is emerging and hence might not yet be reflected in the training system. (Boyton 2022)

Various advanced technical skills in the digital and data space are likely to fit this description. For example, technology product managers — who combine business, technical and user experience skills to oversee a product's development in a way that meets customers' needs — for large-scale products are difficult to find in Australia. Industry stakeholders report that people who have the capabilities to manage products at scale learn by doing. With a relatively small (though growing) number of technology companies operating at a large enough scale in Australia, there is a relatively small talent pool to meet employers' demand for experienced product managers in the short term. Some have noted that 'if Australia wants to improve its technology industry, the discipline of product management "needs to grow up a little bit"' (Gillezeau 2020).

Because of the importance of on-the-job experience in developing these types of specialised skillsets, many employers look to recruit workers from overseas where there is a deeper talent pool. This targeted sourcing of workers from overseas is used not only to fill immediate skills gaps, but also to support the longer-term development of the workforce in Australia. For example, overseas workers join local teams and are able to bring their experience to support on-the-job learning for local employees. As technology products are scaled up, these local workers can further develop more advanced technical skills on the job.

Some businesses operating internationally have work-from-anywhere policies, which enable them to hire specialist digital and data workers in other countries and integrate them with their Australian teams. This distributed workforce approach has increased through the COVID-19 pandemic; for example, Atlassian introduced its 'Team Anywhere' policy in 2020 and transitioned to a fully distributed workforce (Atlassian 2022). The Commission heard from both large and small Australia-based technology companies that they are able to tap into overseas skilled workers by building integrated teams comprised of local staff and employees in North and South America, Europe, Asia and Africa.

Skilled migration is another channel for Australia-based businesses to access the global talent pool for specialist digital and data skills. There are several options for overseas workers with these skills to acquire a visa for employment in Australia.

- The Temporary Skill Shortage (TSS) visa (subclass 482) is 'important for technology companies of all sizes' (TCA 2021a) as a source of workers with advanced technical skills that are difficult to recruit in Australia. It includes short and medium-term streams that require workers to be sponsored by an employer for an occupation that is on a relevant skilled occupation list (Home Affairs 2021d). As at end February 2022, specialist digital and data occupations eligible for the short-term stream included software testers and web developers, and eligible workers for the medium-term stream included developer programmers and software engineers (Home Affairs 2021c).
- The Global Talent (Independent) visa (subclass 858) seeks to attract highly skilled workers across ten target sectors, including 'DigiTech', 'Agri-food and AgTech' and 'Financial Services and FinTech'. These respectively represented 34%, 12% and 1% of the 9 584 visas issued in 2020-21 (Home Affairs 2021a, p. 37). There are 15 000 visa places available under this program in 2021-22 and workers do not need to be employer sponsored (Home Affairs 2021f).
- The Global Talent (Employer Sponsored) program allows employers to sponsor workers with specialised skills that are not eligible for other visas (such as the short and medium-term streams of the TSS visa). Visas are issued under the labour agreement stream of the TSS visa and accredited employers are not restricted to occupation lists (Home Affairs 2021e). Several technology and data-related employers were accredited as at end February 2022, including Amazon, Culture Amp and Refinitiv (Home Affairs 2022b).

Several stakeholder submissions noted that the approach of using skilled occupation lists for some of these visas could be improved, as this would better enable employers to address local digital and data skills needs (AIC, sub. 71, p. 11; Consult Australia, sub. 28, p. 9; TCA, sub. 51, p. 16). In particular, the Tech Council of Australia observed that 'Australia's skilled occupation list is arbitrarily complex and outmoded, due to its reliance on an occupation classification system that does not recognise tech sector roles' (TCA, sub. 51, p. 16). Some inquiry participants suggested that the government should review skilled migration policy settings to better attract and prioritise workers with the digital and data skills that are currently in high demand across Australian employers (ACCI, sub. 175, p. 13; CPRC, sub. 115, p. 8).

The companion volume in this inquiry, *A more productive labour market*, discusses migration policy more generally and includes several recommendations to improve Australia's skilled migration program, such as shifting away from overly restrictive and inflexible occupation lists for employer-sponsored temporary and permanent skilled migration. Instead, the government should implement wage thresholds for employer-sponsored visas, whereby employers can sponsor overseas workers in any occupation as long as they are paid above the relevant threshold (with a lower threshold for temporary migration and permanent migration thresholds to increase with age). Implementing such changes would improve the ability of Australian employers to supplement their workforce with specialist digital and data skills from overseas that are difficult to source or develop locally in the short run.



Finding 4.15

Skilled migration assists in meeting digital and data skills needs

Not all digital and data skills needs can be met locally or with education and training in the short term. Skilled migration enables businesses to access a deeper talent pool, particularly for specialist skills that are difficult to find or develop in Australia. However, the occupation lists that underpin much of the skilled migration system are not sufficiently flexible or up-to-date to meet employers' digital and data skills needs.

Increasing digital literacy among the broader population

In addition to the specialist technology and data workers that are in high demand, an increasingly digitised economy and society — as discussed in section 1.1 — means that most Australians need some level of baseline digital skills (sometimes referred to as 'digital literacy') in order to work and live. The Australian Government's *Digital Economy Strategy 2030* reported that 87% of jobs now require digital skills – across every sector and industry (PMC 2021c, p. 16). The Smith Family has observed that a lack of basic digital skills in some population cohorts has flow on effects to their ability to participate in a high-skilled 21st century economy (The Smith Family, sub. 26, p. 15).

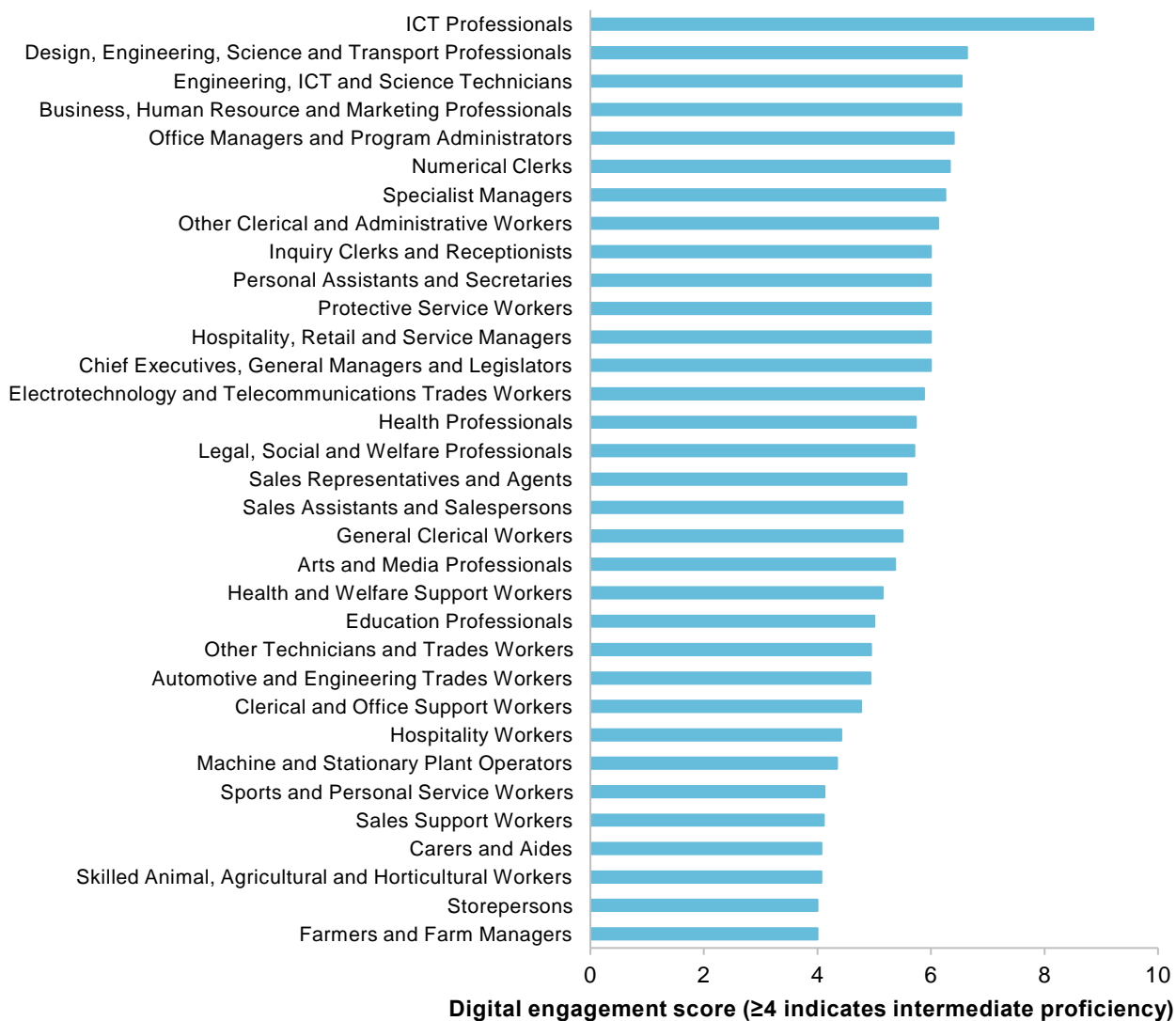
In this context, ensuring that the broader population has adequate levels of digital literacy supports both a more productive workforce and a more inclusive society, as services and other interactions continue to move online. Increasing broader digital literacy may also serve to raise awareness of cyber security risks and lessen the impact of cyber attacks.

The jobs that require a good foundation of digital literacy are many and varied. According to the NSC's Australian Skills Classification, most occupations in the Australian labour market need either intermediate or high proficiency on the digital engagement core competency (which provides an indication of the digital literacy requirements of different jobs).¹⁷ This extends beyond IT roles, with other occupations requiring relatively high competency in digital engagement including engineering and science professionals, business and marketing professionals, and office managers (figure 3.12).

However, there are concerns about digital literacy levels among Australian employers and employees. From an employer perspective, recent research on the learning and development activities of Australian businesses found that 26% of surveyed businesses reported digital literacy as a key skills gap (increasing to 34% for the business services industry) (DeakinCo and Deloitte Access Economics 2022, p. 11). And a survey of Australian workers found that with regards to digital literacy skills, 24% of those surveyed stated that they 'don't have the skill level required [by their employer] or skill is out of date' (RMIT Online and Deloitte Access Economics 2021, p. 15). Digital literacy was the second-largest skills gap reported by workers, with data analysis being the biggest identified gap — inadequate or outdated data analysis skills were reported by 30% of those surveyed (RMIT Online and Deloitte Access Economics 2021, pp. 14–15).

¹⁷ The Australian Skills Classification contains '10 core competencies common to every occupation in Australia [and] uses a 10-point scale to describe the complexity of each core competency for each occupation' (NSC nd). The digital engagement core competency captures non-specialist skills associated with using technology — including hardware and software — in any occupation. Occupations are assessed as requiring digital engagement proficiency of basic (score of 1–3; for example, sending simple email communication), intermediate (score of 4–7; for example, using software on a portable device) or high (score of 8–10; for example, setting up a large computer system).

Figure 3.12 – Digital competency is required for many occupations outside of IT jobs
Average score on digital engagement competency for 2-digit occupations requiring intermediate proficiency or higher, March 2022^a



a. The NSC’s Australian Skills Classification contains a competency score on digital engagement for 799 selected 4- and 6-digit occupations (as defined in ANZSCO). Scores corresponding to occupations within a given 2-digit grouping have been averaged for this figure. Only occupations requiring ‘intermediate’ or higher proficiency (that is, scoring four or more on the 10-point scale) are depicted in this figure, which represents 33 of the 43 2-digit occupation groupings.

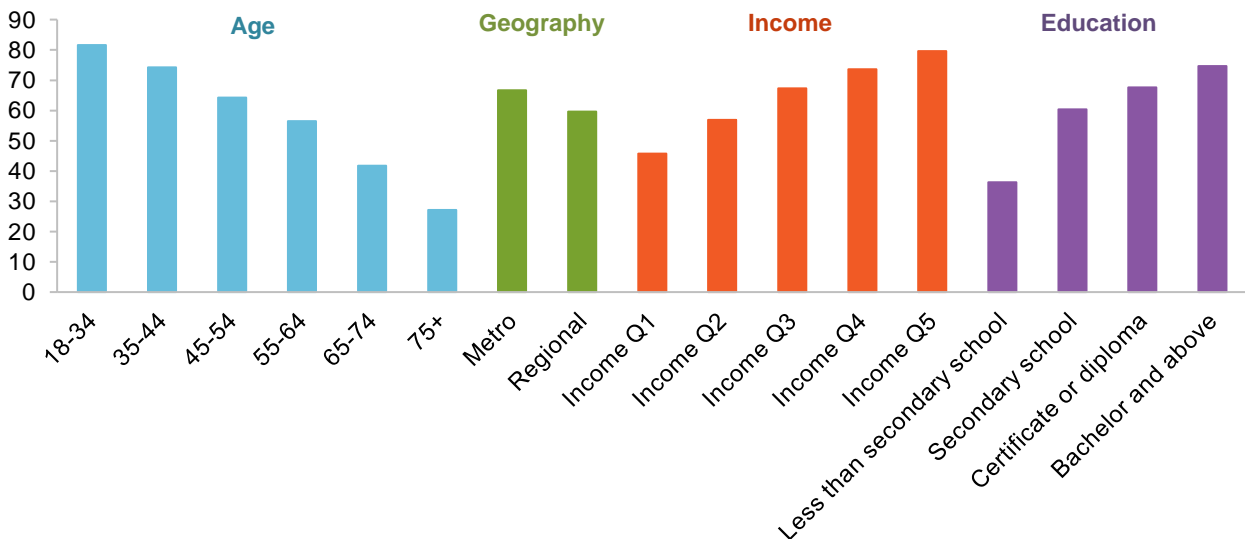
Source: NSC (2022).

Some segments of the Australian population have lower digital literacy levels than others. For example, the Australian Digital Inclusion Index reported a significant gap in digital ability between older and younger Australians in 2021 (figure 3.13). The Index is based on the Internet Skills Scale, which includes both basic and advanced digital capabilities; advanced capabilities (such as operating IoT technologies and using the cloud) may go beyond the baseline skills required to undertake everyday digital tasks. However, even when only considering basic operational skills (such as downloading files and setting passwords) and information navigation (such as searching the internet and verifying information), there are substantial gaps between the youngest and oldest age cohorts (ADII 2021). The Index also reports a digital ability gap between Australians

living in metropolitan and regional Australia, and lower digital ability scores for cohorts with lower income and education levels (figure 3.13).

Figure 3.13 – Digital ability declines with age, income and education levels and is also lower in regional Australia

Index of digital ability overall in 2021, by age, geography, income and education^a



a. Income quintiles are defined as follows: Q1 represents incomes less than \$33 800, Q2 represents \$33 800 to \$51 999, Q3 represents \$52 000 to \$90 999, Q4 represents \$91 000 to \$155 999, Q5 represents incomes of \$156 000 or more.

Source: ADII (2022).

As increasing amounts of economic and social activity are taking place via online channels, low digital literacy in some population cohorts can reduce their ability to consume essential services and undertake everyday transactions. Just as a lack of regional digital infrastructure may lead to social exclusion (section 3.1), people with limited digital ability can face difficulties accessing services such as home schooling, telehealth consultations and online banking. This could compound economic and social disadvantage; for example, low digital literacy among low income earners or those who have had limited education opportunities can be a significant barrier to accessing and maintaining employment (ACOSS 2016, p. 3). And limited ability to use digital health services in remote areas, which already have greater difficulties accessing health care in person, can lead to more vulnerabilities and health risks in these areas (Beaunoyer, Dupéré and Guitton 2020).

There are already government initiatives aimed at improving the digital literacy of various cohorts. For example, the Australian Government’s Regional Tech Hub — delivered by the National Farmers’ Federation and Australian Communications Consumer Action Network — supports regional and remote Australians to connect to new technologies, including by ‘troubleshoot[ing] common connectivity problems’ (DITRDC 2019). The Victorian Government’s Regional Digital Fund provides grants that include projects for building digital skills and capability in regional Victoria (RDV 2021). And to increase the digital literacy and online safety of older Australians, the Australian Government’s *Be Connected* program provides a range of resources and interactive tools, including personalised mentoring in local community settings (DSS 2021).

3.4 Balancing cyber security and growth

The growing number of cyber attacks in Australia and the increasing sophistication of these attacks have negative economic consequences (section 2.2). The government's role in mitigating and managing cyber risk is important, but can involve restrictions or additional requirements on private entities, which may inhibit economic growth. For example, unnecessarily burdensome regulation can divert businesses' resources away from other operations, which may negatively affect broader business activities or undermine existing security protocols. The Australian Institute of Company Directors has stated that:

There is a risk that [an overly compliance-focused] approach will divert attention from senior management and directors in actively responding to cybersecurity threats and building resilience and ultimately add to the existing regulatory burden with negative productivity results. (AICD, sub. 44, p. 7)

As such, government activity in the cyber security policy area should be measured and carefully balance the costs of any intervention against its benefits.

Governments should support both cyber resilience and response to cyber attacks. The World Economic Forum defines cyber resilience as 'not only defending against cyberattacks, but also preparing for swift and timely incident response and recovery when an attack does occur...[and] the ability of an organization to transcend... any stresses, failures, hazards and threats to its cyber resources within the organization and its ecosystem' (WEF 2022, p. 15). Although this indicates that cyber resilience is broader than just the attack response itself — as it includes elements of prevention beforehand and longer-term recovery after the fact — many stakeholders focus narrowly on responding to an attack. A recent global survey of cyber leaders found that 59% did not have a good understanding of the differences between cyber security response and cyber resilience, believing that the two are synonymous (WEF 2022, p. 15).

There is already significant Australian Government activity addressing cyber security issues. *Australia's Cyber Security Strategy* was released in 2020 (Home Affairs 2020a), building on an earlier strategy from 2016, and various pieces of legislation and initiatives have been implemented (box 3.5).

Box 3.5 – Australian Government activity on cyber security issues

The centrepiece of the Australian Government's cyber security policy is *Australia's Cyber Security Strategy 2020*, which highlighted a range of investments made by the government's \$1.67 billion of (then) budgeted expenditure on cyber security over 10 years (Home Affairs 2020a). This included the Cyber Enhanced Situational Awareness and Response package, which was announced in June 2020 and allocated funding to various initiatives such as expanded capabilities and workforce at the Australian Signals Directorate (ASD), creating a new cyber threat-sharing platform for information sharing between industry and government, and more research, mitigation and prevention activity (Defence 2020). The Australian government also released the *National Plan to Combat Cybercrime* in March 2022 to increase collaboration between Commonwealth, state and territory partners in combating cyber crime (PMC 2022b, p. 17).

The Australian Cyber Security Centre (ACSC) is part of the ASD and was established in 2014. It monitors cyber threats, provides information about good security practices, and investigates and assists with responses to security incidents. The ACSC runs various programs to improve cyber security across both large critical infrastructure organisations and smaller businesses and individuals. It also promotes

Box 3.5 – Australian Government activity on cyber security issues

collaboration between industry, researchers and government agencies through workshops and events run by its Joint Cyber Security Centres.

There has been a range of legislation enacted regarding the cyber security of Australia's critical infrastructure. The *Security of Critical Infrastructure Act 2018* (Cth), *Security Legislation Amendment (Critical Infrastructure) Act 2021* (Cth) and *Security Legislation Amendment (Critical Infrastructure Protection) Act 2022* (Cth) apply to 11 sectors that are deemed to be critical infrastructure. Companies covered by this legislation need to meet additional cyber security obligations such as mandatory incident reporting to the ACSC, being subject to government intervention in response to a serious security incident if certain conditions are met and (for some entities) needing a risk management program (CISC 2022b).

Other legislation applies more broadly outside of critical infrastructure. Breaches of personal data are covered under the *Privacy Act 1988* (Cth) and breaches involving financial institutions are covered by the Prudential Standard CPS 234 on Information Security. There are also potential liabilities under the *Corporations Act 2001* (Cth) if 'directors failed to set up proper standards of cyber security to be implemented by management, for the protection of the company's business' (PwC 2017). For example, a financial advice company was recently found to have contravened the Corporations Act because of 'its failure to have documentation and controls in respect of cybersecurity and cyber resilience in place that were adequate to manage risk' (FCA 2022, p. i).

The Australian Government released a Ransomware Action Plan in October 2021, in part reflecting the significant growth in ransomware attacks reported to the ACSC (Home Affairs 2021b). It is intended to complement the broader initiatives and overarching approach outlined in the *Cyber Security Strategy*, with key elements introduced in the Crimes Legislation Amendment (Ransomware Action Plan) Bill 2022 in February 2022 (Parliament of Australia 2022). These included new criminal offences relating to ransomware attacks and stronger powers to investigate offshore cyber criminals and seize digital assets (Lim et al. 2022). The mandatory ransomware incident reporting scheme that was proposed in the Plan is still under development and was not included in this Bill. The Bill has since lapsed with the dissolution of Parliament in April 2022.

Providing information about good security practices and response

Government initiatives to improve cyber resilience and response should be 'light touch' where the risks are relatively low. This minimises the potential for unnecessary costs to be imposed on businesses while still supporting better security outcomes. Providing guidance to Australian businesses and individuals on how to build cyber resilience and respond appropriately to cyber attacks is one form of comparatively minimal intervention.

There is already a range of information published by the government about improving cyber security practices. The Australian Cyber Security Centre (ACSC) — which sits within the Australian Signals Directorate (ASD) — has various resources to assist individuals, small and medium businesses, larger organisations and critical infrastructure providers, and government agencies with mitigating, managing and anticipating cyber risks. These include:

- step-by-step guides that are more targeted towards individuals and smaller businesses, which outline basic and practical security instructions such as turning on automatic updates, using two-factor authentication and securing communication channels (ACSC 2020)
- material for larger and more mature organisations that require further guidance, including the 'Essential Eight' set of baseline mitigation strategies for cyber protection (ACSC 2021c) and the Information Security

Manual, which advises organisations on selecting, implementing and assessing security controls in a way that is most relevant to their circumstances and risks (ACSC 2022b).

While widely available general guidance is useful, a previous study on small businesses' cyber security practices reported that there is:

... a desire for targeted recommendations that speak to their specific circumstances. A key complaint about [the ACSC's website] is that the information is too general, which makes it hard for study participants to apply to their own circumstances. ... Small businesses don't expect personalised support from free sources like [the ACSC's website], but the generic approach is not working. (Cynch Security et al. 2021, p. 31)

Improving the relevance and accessibility of general cyber security advice would require providing guidance based on businesses' specific operations and risk factors. Internationally, the Scottish Government has proposed the 'development of a freely accessible online tool to support SMEs, in particular, to undertake a cyber threat assessment... and be directed to appropriate guidance or standards' (Scottish Government 2018, p. 44). The Australian Government has a Cyber Security Assessment Tool, in which a business can complete an online survey about their industry, size, use of technology and current security practices (such as updating software, secure passwords, multi-factor authentication, information backups and incident planning) (DISER 2021). Based on their answers, businesses are assigned a cyber security maturity level using a four-point scale — from 'starter' to 'champion' — and provided with tailored suggestions, including actionable improvements and relevant links to the ACSC's step-by-step guidance.

However, SMEs continue to have relatively lower uptake of cyber security software, as discussed in section 2.2. More use of the interactive Cyber Security Assessment Tool by SMEs would support the adoption of more effective security practices and increase the value derived from information already published by the government. One channel for increasing awareness about this tool could be through industry associations — information could be shared between members, particularly to smaller businesses, about cyber security risks and tools for managing these risks.

Cyber security guidance can also help businesses and individuals to respond to incidents quickly and effectively after a breach occurs. Low and no-cost services are likely to have the highest uptake; for example, IDCARE is a not-for-profit organisation that provides free information and education to those who have been affected by cyber fraud. It is funded by subscribers such as major banks, government agencies and airlines, which themselves receive tailored incident response support (IDCARE 2022). The government has also published advice on cyber response, including in the ACCC's Scamwatch (ACCC 2022i) and the ACSC's ransomware response guide (ACSC 2021d). These initiatives collect and disseminate information from entities that have experienced cyber fraud, assisting other consumers and businesses to recover should they experience similar scams and ransomware incidents (ACCC 2021e, p. 72).

Regulation is required for high-risk situations

It is reasonable that situations posing greater cyber security risks to the broader Australian economy and society require stronger government activity than just providing guidance. Higher-risk cases include situations where a cyber attack on one entity could have widespread negative effects, such as where the entity has many interdependencies with and connections to other businesses and individuals (as discussed in section 2.2). It could also include instances where a cyber attack would reduce the availability of a service or asset that is essential to the functioning of the economy or society, such as water, energy or medical services.

More substantial government intervention could involve imposing regulation on companies for which an attack would represent a significant broader risk. Cyber security regulations must be designed and

implemented in a way that minimises unnecessary burdens, is not excessively intrusive and establishes clear expectations of the regulated entities. As summarised in box 3.5, the Australian Government has already passed several pieces of legislation regarding the cyber security of critical infrastructure sectors and assets, which have been identified as potentially facing higher risks. There are mixed views about the evolution of Australia's critical infrastructure legislation to date, regarding both the government's approach to developing and implementing the regulations, and its content.

On the approach, given the potential for these regulations to have large and complex impacts on businesses' core operations, industry consultation is important to enable government to understand the implications of its changes and address concerns about its approach, if possible. There has been some stakeholder engagement in developing the Australian legislation since the Department of Home Affairs first released its consultation paper in August 2020 (Home Affairs 2020b). However, industry stakeholders have observed that the *Security Legislation Amendment (Critical Infrastructure) Act 2021* (Cth) — which included broadening the definition of critical infrastructure, increased reporting obligations and new government intervention powers — was rushed following the recommendation of the Parliamentary Joint Committee on Intelligence and Security, which did not allow for suitable consultation (Karen 2021; Kwan 2021).

The Commission has heard from stakeholders that, while many affected companies appreciate the intent of critical infrastructure security legislation, inadequate consultation early in the process created significant uncertainty and apprehension. Companies observed that 'the "early days" of consultation had moved "a little too fast" and ... it was more important to get things right than out the door' (Barbaschow 2021b). The Commission also heard that industry engagement has improved over time; for example, by incorporating small-group consultations rather than relying on large town-hall meetings, and clarifying and finessing definitions and rules. There are several instances where the Department of Home Affairs has revised the details of their approach following industry feedback, such as in relation to the risk management programs required by the *Security Legislation Amendment (Critical Infrastructure Protection) Act 2022* (Cth) (Home Affairs 2022a).

Regarding the content of the legislation, specifying baseline cyber security obligations and reporting requirements for these higher-risk sectors is necessary government activity to protect national interests, given the negative externalities and information asymmetries involved (section 2.2). There may be opportunities to improve how these requirements are implemented; for example, more streamlined reporting to reduce overlapping obligations is discussed below. Broadly speaking, the Australian Government's actions are consistent with the increasing global regulatory activity in this space, as various other countries have also introduced cyber security regulations for critical infrastructure. These include the US's *Cyber Incident Reporting for Critical Infrastructure Act* (2022) and the EU's *Directive on Security of Network and Information Systems* (2016) (which has since been expanded to cover more critical sectors and entities).

The strongest element of Australia's critical infrastructure regulations is the government's new powers to intervene and assist a critical infrastructure provider in responding to a serious security incident. Industry feedback on this aspect of the legislation has been mixed: while some companies are open to receiving government assistance, as long as it is proportionate and done jointly with the company, others (especially in the technology sector) believe the harms of such government intervention outweigh the benefits (Barbaschow 2021a). In practice, the government may rarely have to use these powers if companies have suitable risk mitigation and management processes that minimise the likelihood of serious incidents occurring — and the rest of the critical infrastructure security obligations seek to ensure this is the case. However, the mere existence of intervention powers in the legislation could have the unintended consequence of deterring investment, particularly by multinational companies if Australia is ahead of other countries in implementing such requirements.

As it is early days, more time is required to assess whether the current suite of critical infrastructure regulations strike an appropriate balance between securing high-risk sectors while not unduly discouraging future growth. The government should monitor and evaluate the effectiveness and economic impact of implemented policies to improve its understanding of the trade off between security and growth, and recalibrate the regulations as required. Cyber security company Palo Alto Networks has observed that ‘there is no independent review process articulated in the bill... this is contrary to some of the approaches taken in like-minded jurisdictions’ (Williams 2022). An evaluation mechanism could also improve government’s ability to incorporate industry feedback into its regulations.



Finding 4.16

Security regulations need to balance risk management and innovation impacts

Cyber security regulation of high-risk sectors needs to manage the risks without unnecessarily deterring businesses’ innovation and investment. The impacts of the government’s recent critical infrastructure security regulations remain unclear but, while more time and information is required to understand whether these regulations strike an appropriate balance, there is no evaluation or review process included in the legislation.

Streamlining incident reporting requirements to avoid duplication

There is currently no universal requirement for Australian businesses to report cyber security incidents. However, there are several mandatory reporting obligations for specific types of businesses that have experienced particular kinds of incidents (including under some of the Australian Government’s cyber security initiatives summarised in box 3.5). These requirements relate primarily to operators of critical infrastructure, organisations that have experienced breaches of private personal data, financial organisations and proposals for large businesses that experience ransomware attacks.

- Under the *Security of Critical Infrastructure Act 2018* (Cth) (SOCI Act), and subsequent amendments, critical infrastructure asset owners and operators must report critical incidents (with a ‘significant impact’ on their asset) within 12 hours of becoming aware of the incident, and other security incidents (with a ‘relevant impact’ on their asset) within 72 hours. Reports must be made to the ACSC (CISC 2022a).
- The *Privacy Amendment (Notifiable Data Breaches) Act 2017* (Cth) amended the *Privacy Act 1988* (Cth) to require organisations to ‘notify affected individuals and the [Office of the Australian Information Commissioner] when a data breach is likely to result in serious harm to an individual whose personal information is involved’ (OAIC nd). The scheme applies to all organisations covered by the Privacy Act, which includes Australian Government agencies and businesses with annual turnover of more than \$3 million. The Privacy Act is currently being reviewed, and some submissions to the review have observed that ‘small businesses [with turnover of less than \$3 million] pose a significant cyber security risk... requiring small businesses to comply with the Act (in particular... the Notifiable Data Breaches Scheme) could be a mechanism to mitigate this risk’ (AGD 2021, p. 42).
- In the financial services sector, the Prudential Standard CPS 234 on Information Security requires entities regulated by the Australian Prudential Regulation Authority (APRA) — including banks, insurers and superannuation funds — to notify the regulator of material information security incidents within 72 hours. Entities must also notify APRA of material information security control weaknesses within 10 business days (APRA 2019, p. 8).
- The current proposal for mandatory reporting in the Ransomware Action Plan requires businesses with annual turnover of more than \$10 million to report ransomware attacks. Similar to the SOCI Act,

ransomware incidents with a 'significant impact' on a business would need to be made to the ACSC within 12 hours and incidents with a 'relevant impact' within 72 hours, with a follow-up report subsequently required to provide 'material details' about the incident (Lim et al. 2022).

Various other countries have similarly disparate requirements for cyber incident reporting. For example, in the United States, all 50 states have laws that require companies to notify residents if their sensitive personal data has been breached, but these requirements vary across states (such as needing to notify different parties or specifying different notice content and timing) (DLA Piper 2022). There are also federal laws, such as the recently passed the *Cyber Incident Reporting for Critical Infrastructure Act (2022)*, which creates obligations to report cyber attacks on critical infrastructure. The numerous requirements can complicate compliance for businesses, particularly those operating in multiple states.

The proliferation of reporting requirements and the need to report to different agencies could place unnecessary burdens on businesses at an already challenging time, when they are focusing on recovering from the security breach. A more unified approach to reporting requirements would assist — the Australian Institute of Company Directors (sub. 44, p. 8) notes that 'the example of cyber incident reporting... reflects a tendency for governments and individual regulators to "go it alone" to respond to an emerging risk. ... Without coordination across government, organisations and boards risk being swamped by complex, inconsistent and duplicative obligations'. The Australian Information Industry Association has also observed that disparate but overlapping cyber security reporting regimes place unnecessary red tape burdens on regulated companies (Smith 2022). The Insurance Council of Australia noted that overlapping cyber incident reporting requirements from the ACSC and APRA are 'compounding resource pressures for insurers, in a historically tight market' (ICA, sub. 203, p. 5).

Increasing coordination between government agencies can help to improve this situation, though coordination can also have its own costs, and these would need to be outweighed by the benefits of a more unified approach to incident reporting. For example, the UK Government has identified this as an area for improvement: one of the central pillars of its *Government Cyber Security Strategy: 2022 to 2030* is 'defend as one' (Cabinet Office 2022). This includes the creation of the Government Cyber Coordination Centre (GCCC), which aims to streamline the government's approach to cyber security, including incident reporting:

[The UK] government will establish a cyber coordination centre to better coordinate operational cyber security efforts across government organisations and truly enhance government's ability to 'defend as one'... the GCCC will foster partnerships to rapidly identify, investigate and coordinate the response to incidents alongside threat and vulnerability reporting. (Cabinet Office 2022)

In addition, early and ongoing consultation with industry when designing and implementing various reporting obligations can help government to identify overlaps between separate requirements and, where possible, streamline these to avoid duplication. Coordination between policymakers and regulators, and the importance of industry engagement, are discussed more generally in section 3.6.

One option to simplify cyber security incident reporting would be to have a single interface or portal for Australian businesses to lodge all cyber incident-related reports required under various regulations. The operating system underlying the interface would then direct reports to the ACSC or relevant government agency as required to inform the response, without the business needing to make multiple reports or spend time identifying to whom and how they need to report. In the future, the government could work with software providers to build cyber incident reporting into commonly used cyber security software, so that reports are automatically sent to the relevant regulator if an incident occurs. This would be a similar approach to that taken by the ATO in working with software providers to build STP reporting into businesses' accounting software (section 3.2), although the coverage and functionality required in the cyber security reporting context is somewhat different.



Finding 4.17

Businesses experiencing security incidents can face multiple reporting obligations

A business may face multiple reporting requirements for a single cyber security incident, depending on its operations and the nature of the breach. This can place unnecessary burdens on businesses that are focused on recovering from the cyber incident. More coordination between government agencies and streamlining of reporting requirements (such as via a single online interface) would assist in reducing reporting burdens on businesses.



Recommendation 4.5

A single interface for cyber incident reporting

The cost for businesses of complying with cyber security regulations should be reduced by streamlining incident reporting requirements, with all reporting to occur via a single online interface. The operating system underlying this interface would then direct reports to the Australian Cyber Security Centre or other relevant government agency as required. This could provide the platform for the government to work with cyber security software providers to build incident reporting functions into commonly used software, so that reports are automatically sent to relevant agencies if an incident occurs.

Embedding cyber resilience and response into government

As users of digital and data tools themselves, governments also have their own responsibilities to build cyber resilience and adopt good security practices. There are a range of initiatives and guidance available to support government agencies in maintaining their cyber security obligations. These include:

- the Protective Security Policy Framework, which features policies on governance and information, personnel and physical security, and requires agencies to annually report their security maturity (AGD nd)
- the security criteria in the Digital Transformation Agency's Digital Service Standard for government services (DTA nd)
- the ACSC's Information Security Manual (discussed above)
- the whole-of-government *Hardening Government IT* initiative, which is being led by the Digital Transformation Agency and includes developing cyber hubs to centralise government agencies' capabilities in cyber threat monitoring, detection and response (DTA 2021).

In addition, the ASD provides direct assistance on cyber security to agencies. In 2020-21, this included conducting 14 cyber uplift activities with Commonwealth entities and publishing quarterly *Cyber Hygiene Improvement Programs* reports to government agencies (including undertaking 34 high priority operational tasking activities) (ASD 2021).

But in a world where increasing volumes of government transactions and services are digitised, more can be done to ensure that government's use of technology and the citizen data it holds are secure. This includes ensuring that all government employees, including those working outside IT functions, are sufficiently trained in basic security protocols to minimise the potential for human errors that could lead to cyber breaches. For example, between January and June 2021, the Office of the Australian Information Commissioner (OAIC) reported that 74% of the Australian Government's data breach notifications were due to human error — a significantly higher rate than the 30% observed across all sectors. The OAIC stated that 'human error

remains a major source of data breaches [and] the human factor also plays a role in many cyber security incidents... Organisations can reduce the risk of human error by educating staff about secure information handling practices and putting technological controls in place' (OAIC 2021).

Government agencies are also large consumers of technology: Gartner forecasts that in 2022, Australian governments — at the federal, state and territory and local levels — will spend almost \$4.7 billion on software (up 19% on 2021 spend) and more than \$6.4 billion on IT services (up 7%) (Govtech Review 2021). As purchasers of digital and data-related products, governments can encourage a greater focus on cyber resilience by incorporating security considerations into their procurement decisions. The Australian Strategic Policy Institute has made several suggestions on how this could be enacted:

One suggested option has been to explicitly include security as a 'fourth pillar' in evaluating proposals, alongside cost, quality and timescales, although this then leaves subjectivity about how to measure security and weight it against the other criteria. A better approach would be an effective pricing mechanism, reflecting the fact that better security should equate to lower financial risk. (Shah 2020, p. 10)

This would incentivise potential suppliers to invest in good cyber security practices, without mandating requirements across all businesses. A similar measure is found in the US Government's *Executive Order on Improving the Nation's Cybersecurity* (The White House 2021). This stipulates that government agencies procuring in-scope software must 'receive attestation from the software producer that the software's development complies with government-specified secure software development practices' (NIST 2022, p. 3). These practices can include assurances that software producers maintain secure development environments (such as enacting multi-factor authentication, data encryption and relationship audits), maintain trusted source code supply chains or are regularly checking for vulnerabilities.

The ACSC provides guidance on how Australian organisations, including government agencies, can manage cyber supply chain risks (ACSC 2021b). Incorporating criteria about a software provider's security capabilities and cyber risk management practices explicitly into government procurement decisions would take this one step further, and incentivise organisations seeking to supply goods and services to improve their cyber resilience.

3.5 Supporting ethical use of technology and data

Emerging technologies such as AI, IoT and virtual and augmented reality have created ethical issues that may not relate directly to productivity, but can degrade trust in businesses' and governments' use of technology and data, which in turn limits adoption. In Australia, trust is the central driver for widespread acceptance of AI in particular: 'if people perceive AI systems to be trustworthy ... this leads to the acceptance necessary to realise the potentially vast societal benefits that AI can produce' (Gillespie, Lockey and Curtis 2020, p. 48). This study also found that perceptions of the adequacy of AI regulations influence trust levels, and about two-thirds of surveyed Australians think that the government should regulate AI (with co-regulation between industry and government also widely supported) (Gillespie, Lockey and Curtis 2020, p. 24).

Ethical concerns about the use of technology and data have arisen around the world. Several well-publicised examples include:

- potential breaches of privacy associated with collecting and storing personal data, or using this data to influence human decisions, such as the Facebook–Cambridge Analytica case (Müller 2020)
- the ability of children to give informed consent for the collection and use of their data, particularly when service providers have complex privacy policies and use 'dark patterns' to nudge young people into accepting terms and conditions that they do not understand (Reset Australia 2021)

- unintended bias in automated decision making systems, such as an American criminal justice algorithm mislabelling African-American defendants as high risk at twice the rate of white defendants (Manyika, Silberg and Presten 2019)
- how to assign responsibility when using automated decision making systems, such as accidents involving autonomous vehicles that have been programmed to react to an oncoming crash by prioritising a driver over a pedestrian (Abu-Khalaf and Haskell-Dowland 2021; Awad et al. 2018).

A proactive approach to managing ethical issues is required to maintain trust while also avoiding hampering technological progress and innovation. There are a number of existing frameworks about the ethical use of technology and data, incorporating principles such as transparency, accuracy and privacy (box 3.6). The Consumer Policy Research Centre has stated that the government should take a holistic approach to data and digital policy 'guided by clearly articulated principles. Without it, the Government is at great risk of developing a policy environment which is not joined up or coherent... which will reduce productivity as well as undermine investment and community trust' (CPRC, sub. 19, p. 3).

Despite the prevalence of these frameworks, the challenge for businesses and governments is turning principles into action. Global examples of how businesses have implemented ethically responsible AI include having an ethics review board of subject matter and ethics experts, which provides advice or approval for ethics strategies and specific use cases (Eitel-Porter 2021), and adopting an 'ethics by design' policy to developing AI systems (EC 2021b).

Box 3.6 – Frameworks and principles guiding ethical use of technology and data

There are numerous frameworks in Australia and internationally that promote the ethical use of technology and data, mainly about the use of artificial intelligence (AI). These have been developed by governments and expert organisations; for example:

- the CSIRO's Data61 AI Ethics Framework discussion paper (Dawson et al. 2019) and the ensuing Department of Industry's Australia's Artificial Intelligence Framework (DISR 2019)
- the Australian Computer Society's AI Ethics Framework (ACS 2021c)
- the University of California's Responsible Artificial Intelligence report (UC 2021)
- the EU's proposed Artificial Intelligence Act (EIPA 2021)
- the US's *Algorithmic Accountability Act* (2019)
- the Office of the Privacy Commissioner of Canada's Regulatory Framework for AI (OPCC 2020)
- the UK's Data Ethics Framework (CDDO 2020)
- the New Zealand Privacy Commissioner and Government Chief Data Steward's principles for safe and effective use of data and analytics (OPCNZ and CDS 2018).

Many of these frameworks cover similar principles, suggesting that there is a strong consensus on how to manage and mitigate ethical risks in using AI and data analytics. Common elements include:

- transparency — informing individuals when AI-enabled tools are used and, to the extent possible, enabling them to understand the methods, potential outcomes, ways to challenge outcomes and remedies to address any harms caused
- accuracy, reliability and safety — developing AI-enabled tools that are effective, accurate and reliably operate in accordance with their intended purpose

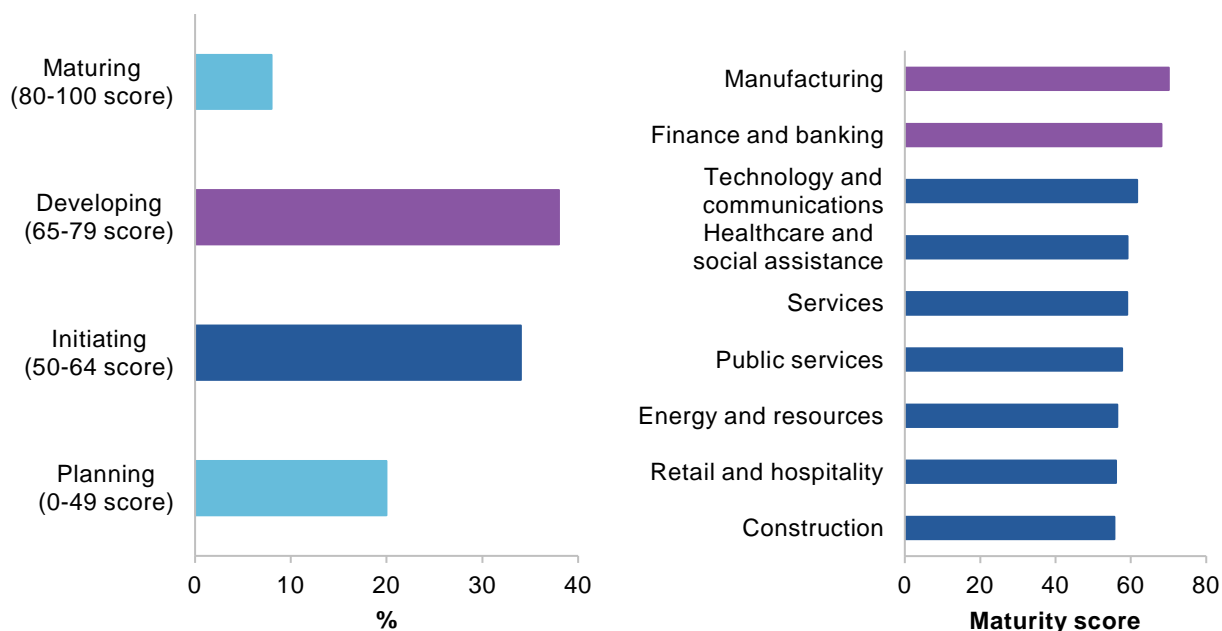
Box 3.6 – Frameworks and principles guiding ethical use of technology and data

- fairness — assessing for bias and the risk that automated decisions unfairly discriminate against individuals, communities or groups. Procedures should be put in place to proactively identify, mitigate and remedy these harms
- privacy and security — designing AI-enabled tools to maximise the privacy and security of personal data
- human-centred values — developing and using AI-enabled tools in ways that respect human rights
- shared and net benefits — creating net benefits that are shared as broadly as possible, including across individuals, society and the environment
- accountability — holding developers and users of AI accountable for outcomes, including unintended consequences
- contestability and auditability — having an efficient and auditable process to allow people to challenge the use or output of an AI algorithm.

Most Australian companies are in the early stages of adopting ethically responsible technology practices, with the *Responsible AI Index 2021* finding that over 90% of surveyed companies were still planning, initiating or developing their AI ethics maturity (Fifth Quadrant, Ethical AI Advisory and Gradient Institute 2021, p. 10). There were industry-level differences in maturity levels, with manufacturing and finance leading the way (figure 3.14). The Committee for Economic Development of Australia reports a ‘disconnect’ in how organisations prioritise responsible use of and consumer trust in AI: 88% of participants in responsible AI workshops state that trust and consumer confidence in AI is a high priority for the future, but only 12% identify it as a current priority (CEDA 2022, p. 20).

On the government side, operationalising ethical principles is important for agencies to maintain their social licence to deliver digital and data-enabled government services, and for supporting confidence in public institutions more broadly. This is particularly crucial where technology is used to deliver sensitive or citizen-facing services. For instance, the ‘Robodebt’ automated debt assessment and recovery program — in which the government wrongly recovered payments from hundreds of thousands of Australians — illustrates how the inappropriate use of algorithmic decision making can more broadly damage trust in government (Rinta-Kahila et al. 2021; Tonkin 2021). The NSW Productivity Commission has pointed out that government policy should be cognisant of these issues as ‘public aversion to technology can prevent its uptake ... and that could in turn stifle private innovation and productivity’ (NSW PC 2022, p. 48).

Figure 3.14 – Most Australian companies are still developing their AI ethics maturity^a
Distribution of responsible AI index maturity scores for all businesses and average scores by industry, 2021



a. The responsible AI index was created using data from a survey of 416 decision makers with influence over AI strategy at businesses with at least 20 employees.

Source: Fifth Quadrant et al. (2021, p. 11).

Government should adopt a risk-based approach

There are various policy options that can support the ethically responsible use of technology and data, ranging from information provision to regulation. Direct intervention and its potential benefits in improving confidence in emerging technology and data uses must be balanced against the potential costs incurred by businesses in complying with government requirements. A risk-based approach is appropriate to guide governments on where stronger activity is necessary, and provide clarity for businesses on where to focus their efforts on improving their ethics maturity.

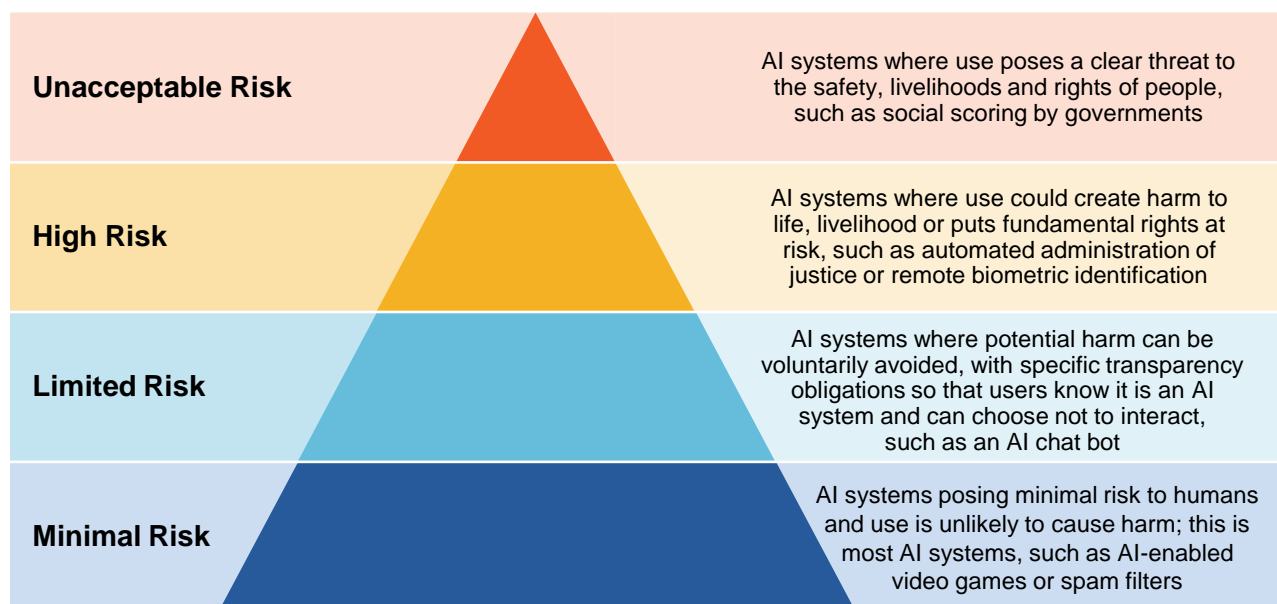
Clearly defining different risk levels and identifying high-risk areas are key to designing government policy on technology and data ethics. Risk categories should be broad enough to cover the ethical use of different digital and data tools, by incorporating considerations around technology types, uses and the kinds of harms to be avoided. For example, unsupervised learning algorithms could fall into a higher risk category because ‘there’s a lack of transparency into how data is clustered’ (Delua 2021), but if such an algorithm was used for relatively innocuous purposes, such as a chess game, it could fall into a lower risk category. Some guidance can be taken from risk-based approaches to ethical issues emerging overseas, such as the EU’s regulatory framework on AI (figure 3.15) and the US’s Algorithmic Accountability Act (2019), which defines a high-risk system as one that contributes to bias or makes decisions about ‘sensitive aspects of consumers’ lives’ (United States’ Congress 2019).

The extent to which high-risk areas need to be monitored by government and potentially require regulation is an open question for policymakers. Around the world, the European Union is currently the most active in exploring regulation for ethically responsible uses of technology and data, specifically for AI. The proposed

Artificial Intelligence Act prohibits AI that poses unacceptable risk (per figure 3.15) and introduces regulations for high-risk uses, such as the need to comply with data governance standards, have risk management systems in place and provide users with transparent information about their AI (EC 2021c, sec. 5,9,10,13). Even when taking a risk-based approach, it is challenging for governments to determine which regulations to apply in high-risk situations as they must balance the requisite protections with growth objectives; for example, the former Chief Executive Officer of Google has argued that the EU's AI transparency requirements are unviable and could stifle innovation (Haeck 2021).

It is vital that government consults widely with industry and technical experts when designing and implementing policy responses to high-risk ethical issues. This is partly because the technical details of emerging uses of technology and data can be challenging for policymakers to grasp, and stakeholder engagement promotes mutual understanding and reduces the possibility of introducing ineffective policies or unnecessarily restrictive regulations.

Figure 3.15 – The EU defines four levels of risk characterising AI systems
European Commission's regulatory framework proposal on AI



Source: EC (2022).

For example, in the case of AI regulation, the Australian Strategic Policy Institute observes that:

...the current limitations in [understanding the 'black box' nature of decisions made by AI from large bodies of data] are the key problem in figuring out how to safely and ethically use and regulate AI... If we can't be certain of what correlations an AI is independently developing to inform data screening and decision-making, we can't be certain that either comply with safe and ethical principles. (Westendorf 2022, p. 5)

Ongoing consultation would also assist in identifying emerging areas that may be higher risk and require stronger intervention, as existing activities by both businesses and governments have predominantly focused on AI ethics. In the future, ethically responsible digital and data use will need to capture other types of technology and anticipate emerging issues. For example, there are likely to be ethical considerations arising from the collection of increasingly sensitive data and questions about how this data can be used — such as the growing ability to gather information about an individual's genetics, health and behaviours and whether it is appropriate for insurance

providers to access and use this data. Stakeholder engagement would help governments to improve their understanding of the potential harms of emerging uses of technology and data, determine whether these uses are genuinely high risk and consider the implications of any proposed policy responses.

The Australian Government has undertaken stakeholder consultations about automated decision making and AI regulation, covering issues such as public trust, transparency in outcomes and the potential for bias or discrimination (PMC 2022c, pp. 10–12). The Department of Industry, Science, Energy and Resources has also conducted an AI ethics principles pilot program with Australian businesses (including the Commonwealth Bank, Telstra, Insurance Australia Group and Flamingo AI) to better understand how ethical principles have been implemented in AI-related processes and products (DISER nd). This industry engagement has improved the government's understanding of new uses of technology and data and the ethical risks that can arise, while also creating valuable feedback loops between government and businesses about practical issues in applying ethical principles.

In addition to these initiatives that are specific to the ethical use of AI, the breadth of the common principles that guide technology and data-related ethics (box 3.6) means that various economy-wide policy frameworks may also apply to the use of AI and other digital tools. These include the cyber security regulations discussed in section 3.4, and privacy regulations for collecting and using data (box 3.7).

Box 3.7 – Privacy regulation needs to balance legal and economic concerns

Digital privacy regulation plays an important role in protecting individuals' rights, and unaddressed privacy issues 'can impact the community's trust and undermine the success of new technological and data initiatives by business and government' (OAIC, sub. 173, p. 3). Industry stakeholders acknowledge that the sheer scale of data held by businesses in the 21st century necessitates a comprehensive legislative approach to privacy protections and obligations (AIIA, sub. 180, p. 4). Clear privacy regulation is also important to guide technological innovation, such as the use of facial recognition software by retailers Bunnings, Kmart and The Good Guys, which was introduced without due consideration of the risks the technology could pose (CPRC, sub. 115, pp. 3–4).

Although there is a clear need for privacy safeguards, there are also trade-offs between more regulation and productivity and efficiency and, as such, the government should not focus solely on legal considerations in setting privacy regulation. For example, after the General Data Protection Regulation was introduced in the EU — placing strict privacy requirements on data sharing — rising compliance costs saw firm profits decrease by 8% and sales decrease by 2% (Presidente and Frey 2022). This primarily affected smaller businesses and there was 'no evidence that large technology companies, such as Facebook and Google, experienced any reductions in either sales or profits' (Presidente and Frey 2022). These effects of regulation on economic activity — especially potential distributional effects on smaller firms — need to be considered when creating digital privacy regulations. An overly legalistic focus on the need for privacy safeguards that is not coupled with a consideration of their costs in limiting data use, competition and technological innovation risks regulation swinging too far in the direction of restriction.

The costs of overly restrictive privacy regulations are not just felt by businesses, but also by individuals. Consumers value their privacy; however, they also place a high value on the products and services that are made available by data sharing. This contributes to a gap between people's stated expectations for online privacy and their online behaviour, or the 'privacy paradox' (Bongiovanni, Renaud and Aleisa 2020). For example, in 2017, 69% of Australians stated they were more concerned about online

Box 3.7 – Privacy regulation needs to balance legal and economic concerns

privacy than they were five years previously (OAIC 2017), but in the same year the Commission observed that ‘more than 70 per cent of us hand over our personal data on social media. More than 80 per cent of us are in a supermarket or airline loyalty program’ (CEDA 2017). Individuals willingly hand over private data through Internet of Things devices (Aleisa, Renaud and Bongiovanni 2020), social networking and other technologies (Barth and De Jong 2017). Balancing consumer protection against consumer preferences is also important when designing privacy regulation.

The government should therefore ensure that when implementing privacy regulation — or when considering changes, such as in the current Privacy Act review — it consults widely with affected stakeholders to balance these legal and economic considerations, and targets interventions towards high-risk areas.

**Finding 4.18****Translating principles of ethical use of technology into action is challenging**

Governments have generally agreed on the principles of ethical use of artificial intelligence, but are still working out how to translate this into action and where policy intervention is required. Given the trade-offs between regulation (including existing economy-wide regulations, such as around privacy) and potential productivity gains, any intervention would need to be appropriately targeted towards high-risk areas, and implemented in consultation with industry and technical experts.

3.6 Coordinating the policy and regulatory environment

The diversity, complexity and pace of change of technology use can make it challenging for governments to design and implement appropriate policy and regulatory frameworks. In addition, while the ever-increasing amounts of data produced in the Australian economy and society provides new opportunities to create value, it also gives rise to new considerations. Some of the issues that governments must grapple with in setting digital and data policy and regulation include:

- ensuring that policy frameworks are fit for purpose — policy settings must be appropriately calibrated throughout the policy life cycle. Given the potential for rapid technological change, they need to respond quickly to issues arising from new digital and data uses so that they remain fit for purpose, such as by taking an adaptive approach to regulation (Eggers, Turley and Kishnani 2018). This also helps to avoid regulatory overreach, as settings can be adjusted if they are unnecessarily restrictive
- enforcing regulation when boundaries are blurred — many uses of technology and data challenge traditional market definitions, including by blurring the definition between consumers and producers, or digital and data service transactions taking place across national boundaries. This can make it difficult to attribute responsibility and enforce laws (OECD 2020, chap. 1)
- accommodating interactions and broader business model changes — the benefits and risks associated with a specific technology can be magnified when it is used in conjunction with other technologies, or when applied to large volumes of data. They can also derive from changes to broader decision making processes or even entire business models (see, for example, CompTIA 2020), and these must be accounted for in designing policy and regulation

- avoiding technological protectionist policies — businesses that stand to lose from new uses of digital and data could seek government assistance and protection through regulation, subsidies or policies that increase the costs of technologically advanced rivals (Lambert 2021). Governments should be wary of vested interests, as these types of intervention would likely slow technology adoption and stymie new innovations.

Given these considerations, focusing policy settings too narrowly on an individual technology or a single aspect of data use is likely to be ineffective. Such an approach risks creating disparate regulations that target specific problems, and this kind of piecemeal regulatory environment could lead to additional uncertainty or costs for businesses, deterring adoption of productivity-enhancing uses of technology and data. For example, various cyber security regulations that seek to address different security risks and sectors have led to multiple incident reporting requirements for some businesses, as discussed in section 3.4. The Tech Council of Australia submitted that government should take ‘a holistic approach to regulation... [and] provide regulators with clear expectations and accountability for considering the need to minimise uncertainty and compliance costs’ (TCA, sub. 51, pp. 18–19).

Australia has also, at times, taken a reactionary approach to addressing specific digital, data and cyber security issues. This may have unintended consequences, whereby legislation intended to address a narrow issue or sector eventually has a broader impact, due to the interlinked nature of digital and data activities. For instance, the *Criminal Code Amendment (Sharing of Abhorrent Violent Material) Act 2019* (Cth), criminalising violent online content in response to the 2019 Christchurch terrorist attacks, and *Telecommunications and Other Legislation Amendment (Assistance and Access) Act 2018* (Cth), allowing government to access encrypted communications, were both ‘drafted very broadly and much of the criticism has focussed on the unintended consequences that arise from that approach’ (Chatwood and Allen 2019). But the urgency with which these laws were designed and passed, in order to respond to particular concerns, meant that consultation about their potential broader implications was limited.

Many of the policy areas where there has been piecemeal or reactive activity are issues that are worthy of government attention. However, government responses would be more effective at supporting emerging digital and data uses if they were better coordinated, with industry previously observing that a regulatory framework that is ‘largely piecemeal and lacks coordination, potentially creat[es] suboptimal implementations of many [regulatory] initiatives’ (Data Republic 2020, p. 15). In interviews with government, regulators, industry and civil society about effective approaches to technology regulation, the Tech Policy Design Centre found that a common theme was ‘calls for consistent political leadership and improved coordination between and among regulators and policy agencies’ (Weaver and O’Connor 2022, p. 8).

More coordination between different government agencies with oversight over digital, data and cyber security issues would likely improve decision making and reduce uncertainty for regulated entities. Such coordination also provides a forum for agencies to discuss good practices and successful approaches to designing and implementing policy and regulation, including how they have navigated the complexities described above. For example, agencies could share information about emerging risks or unintended consequences of particular regulations. They could also work together to identify areas of duplication or inconsistencies in their respective activities — coordination on these matters is particularly important in areas where government sets minimum standards or supports technology or data interoperability between different parts of the economy.

Recognising the benefits of increased coordination, the UK Government formed the Digital Regulation Cooperation Forum (DRCF) in 2020. It now comprises the Competition and Markets Authority (which regulates competition in digital markets), Information Commissioner’s Office (personal data protection), Office of Communications (online safety and communications security) and Financial Conduct Authority (online financial scams). The DRCF enables joint responses to technological developments that cut across multiple areas, more coherent regulatory approaches for interrelated issues (for example, overlaps between

data protection and competition regulation) and collectively developing technical expertise and analytical capabilities (CMA 2021). In 2021 to 2022, it created cross-regulatory teams across participating agencies covering four digital and data topics: algorithmic processing, regulatory design frameworks, digital advertising technologies and end-to-end encryption (DRCF 2022).

More recently in Australia, the Digital Platform Regulators Forum (DP-REG) was established in March 2022 to improve coordination on digital platform regulation between the ACCC, ACMA, OAIC and Office of the eSafety Commissioner. DP-REG will meet every two months to 'share information about, and collaborate on, cross-cutting issues and activities relating to the regulation of digital platforms [such as] how competition, consumer protection, privacy, online safety and data intersect' (DP-REG 2022, p. 1). At its first meeting, DP-REG members identified transparency and accountability of digital platforms' activities, the impact of algorithms such as in product recommendations and harmful content, and collaboration and capacity building between the four regulators as priorities for 2022/23 (ACCC 2022c). The regulators involved have benefited from using the forum to improve their assessment of emerging digital risks and deepen their engagement with relevant stakeholders (eSafety Commissioner, sub. 87, p. 4; OAIC, sub. 173, p. 11).

Stakeholders have observed that improving coordination between government agencies that design and implement policy and regulation would be beneficial more broadly across digital and data issues (not just for digital platforms), and that it could provide a forum for more industry engagement. For example, the Australian Information Industry Association suggested that:

... the relevant people who are creating laws and policies that govern the tech sector should come together and work on any new regulation and industry needs to be part of that process. It would stop this fairly siloed, knee-jerk response to issues as they arise ... If you get better policy outcomes and industry endorse it, then it's good for government. (Smith 2022)

The Tech Policy Design Centre notes that both the DRCF and DP-REG comprise regulators only, and proposes a coordination model that includes both regulators and policymakers. Its preferred Tech Policy and Regulator Coordination Model 'takes an ecosystem wide approach [that] responds to calls for political leadership, strengthened coordination, increased transparency, access to independent technical expertise, and regularised, meaningful input by industry and civil society [but] does not alter the independent mandates of existing policy owners or regulators' (Weaver and O'Connor 2022, p. 10). While the DRCF and DP-REG do not have a formal mechanism for other stakeholders to participate, the proposed Tech Policy and Regulator Coordination Model includes both an Expert Forum to seek regular input from industry and civil society, and an Advisory Panel that would provide ad-hoc technical expertise as required (Weaver and O'Connor 2022, pp. 12, 14).

In addition, more coordination between domestic policymakers and regulators provides a platform for Australia to better engage with policymakers and regulators in other countries on technology and data issues, which often spill across international borders in a digital world. This is important for collaborating on global policy areas such as cross-border data flows, with the World Economic Forum highlighting that:

...progressive cross-border data flows policy has come into its own as a policy lever for ambitious governments seeking economic recovery. [However,] laws and policies that act as barriers to this type of international data sharing are on the rise... slowing technological innovation and limiting positive societal impact. (WEF 2020a, p. 5)

There can be cross-country differences in digital and data regulations and policy frameworks. While this often justifiably reflects different countries' priorities and constituents, it can create additional burdens for businesses that operate in multiple jurisdictions. They may face extra costs in meeting inconsistent requirements, and potentially withdraw from smaller markets where regulations differ from those in larger markets because the costs outweigh the benefits of conforming to an additional set of rules. Greater international engagement between policymakers

and regulators would support the development of 'interoperable policy frameworks that can streamline requirements across borders and create mechanisms to reduce regulatory overload' (WEF 2020a, p. 5).

Where cross-country inconsistencies in digital and data policies and regulations persist, international engagement would help Australian government agencies to understand the varying requirements of other jurisdictions. If other countries have adopted requirements on matters such as data security or consumer protections that differ to Australia's but partly or fully address local concerns, domestic authorities could take approvals from these other countries into account when assessing whether a business has met Australian requirements. This approach is already used in some other sectors requiring regulatory approval — for example, in medicinal manufacturing, Australia's Therapeutic Goods Administration has agreements with other countries' authorities that allow it 'to use inspections conducted by these regulatory authorities as part of the [Good Manufacturing Practice] clearance process in lieu of performing our own on-site inspection' (TGA 2017). And in food safety, Australia has a recognition agreement with the US Food and Drug Administration, 'recognising Australia's food safety system and the US food safety system are comparable/ equivalent to each other' (DAWE 2022).

Finally, increased coordination between government agencies — and more engagement with industry and overseas regulators and policymakers — can have financial and time costs. Some formal coordination mechanisms need dedicated resources (such as a secretariat), and even models that simply involve regular meetings between agencies will require existing staff to make time to prepare for and attend these meetings. These costs should be weighed against the economy-wide benefits of improving coordination in determining the appropriate model to be implemented.



Finding 4.19

Greater coordination in digital and data policy could support technology adoption

Existing coordination between Australian government agencies on technology and data issues only includes regulators, not policymakers, and focuses on digital platforms. More coordination could reduce uncertainty for regulated entities and improve engagement with industry and overseas, supporting adoption of productivity-enhancing technologies. The benefits of this would need to be weighed against the potential financial and time costs of greater coordination.

Appendices

A. Modelling business technology adoption

This appendix provides additional details on the logistic regressions discussed in chapter 1. The regressions use 2019-20 Business Characteristics Survey data, which was accessed from the Business Longitudinal Analysis Data Environment.

A logistic regression was estimated for each type of technology that businesses were asked if they used.¹⁸ Technology use was the dependent variable for each regression, with this variable taking the value of 0 if the business did not use the technology and 1 if the business used it. The independent variables were a series of dummy variables indicating the industry, region and number of employees of the business. Baseline categories were the primary industries industry, major cities of Australia region and 0 to 4 employees.

Technology Type

$$\begin{aligned}
 = & \beta_0 + \beta_1 \text{Manufacturing} + \beta_2 \text{Electricity, Water and Waste Services} + \beta_3 \text{Construction} \\
 & + \beta_4 \text{Supply Chain Logistics} + \beta_5 \text{Customer Services} \\
 & + \beta_6 \text{Information Media and Telecommunications} + \beta_7 \text{Knowledge Services} \\
 & + \beta_8 \text{Other Services} + \beta_9 \text{Inner Regional Australia} \\
 & + \beta_{10} \text{Outer Regional and Remote and Very Remote Australia} + \beta_{11} \text{5 to 19 Employees} \\
 & + \beta_{12} \text{20 to 199 Employees} + \beta_{13} \text{200 or more Employees}
 \end{aligned}$$

Table A.1 – Relationship between business characteristics and technology use (1)
Logistic regression results using 2019-20 Business Characteristics Survey data^a

	Customer Relationship Management software	Enterprise Resource Planning software	Electronic Data Interchange	Radio Frequency Identification tags
Intercept	-2.62 *** (0.16)	-2.47 *** (0.2)	-2.62 *** (0.16)	-3.35 *** (0.24)
Ind_Manufacturing	0.84 *** (0.19)	-0.25 (0.22)	0.55 ** (0.19)	-0.57 * (0.24)
Ind_Electricity_Water_and_Waste_Services	0.92 *** (0.23)	-0.47 (0.29)	0.5 * (0.23)	-0.38 (0.32)

¹⁸ The technology types asked about in the 2019-20 Business Characteristics Survey were customer relationship management software, enterprise resource planning software, electronic data interchange, radio frequency identification devices, cloud technology, cybersecurity software, data analytics, internet of things, artificial intelligence, 3D printing, blockchain technology and allowed respondents to indicate if they used other types of technologies or none of the above.

	Customer Relationship Management software	Enterprise Resource Planning software	Electronic Data Interchange	Radio Frequency Identification tags
Ind_Construction	0.31 (0.21)	-1.14 *** (0.25)	0.15 (0.21)	-1.23 *** (0.32)
Ind_Supply_Chain_Logistics	0.83 *** (0.18)	-0.46 * (0.21)	0.81 *** (0.17)	-0.46 * (0.22)
Ind_Customer_Services	0.57 ** (0.17)	-1.61 *** (0.2)	0.46 ** (0.17)	-1.12 *** (0.23)
Ind_Information_Media_and_Telecommunications	1.63 *** (0.21)	-0.25 (0.26)	0.45 * (0.22)	-0.64 (0.34)
Ind_Knowledge_Services	1.75 *** (0.17)	-0.91 *** (0.2)	0.45 ** (0.17)	-0.9 *** (0.23)
Ind_Other_Services	1.26 *** (0.17)	-1.49 *** (0.19)	-0.01 (0.16)	-1.17 *** (0.21)
Reg_inner_regional_australia	-0.31 ** (0.1)	-1.33 *** (0.18)	-0.07 (0.11)	-0.34 (0.21)
Reg_outer_regional_and_remote_and_very_remote_australia	-0.66 *** (0.15)	-1.16 *** (0.22)	-0.27 (0.15)	-0.24 (0.25)
Employee_Size_5_to_19_employees	0.77 *** (0.09)	0.92 *** (0.17)	0.87 *** (0.1)	0.84 *** (0.23)
Employee_Size_20_to_199_employees	1.36 *** (0.1)	2.51 *** (0.15)	1.42 *** (0.11)	1.65 *** (0.23)
Employee_Size_200_or_more_employees	2.2 *** (0.09)	4.31 *** (0.15)	2.44 *** (0.1)	3.28 *** (0.19)
N	5469	5469	5469	5469
McFadden's pseudo R-squared	0.16	0.39	0.15	0.22

a. ***, **, * respectively indicate statistically significant coefficient estimates at the 0.1, 1, 5% levels.

Source: Productivity Commission estimates using data in the ABS's Business Longitudinal Analysis Data Environment.

Table A.2 – Relationship between business characteristics and technology use (2)
Logistic regression results using 2019-20 Business Characteristics Survey data^a

	Cloud technology	Cybersecurity software	Data analytics	Internet of things
Intercept	-0.59 *** (0.11)	-1.22 *** (0.12)	-2.57 *** (0.18)	-2.32 *** (0.17)
Ind_Manufacturing	-0.2 (0.15)	-0.1 (0.16)	-0.49 * (0.21)	-0.12 (0.2)
Ind_Electricity_Water_and_Waste_Services	0.06 (0.18)	0 (0.2)	0.14 (0.26)	0.41 (0.23)
Ind_Construction	-0.24 (0.15)	-0.51 ** (0.17)	-1.15 *** (0.27)	-0.43 (0.23)
Ind_Supply_Chain_Logistics	-0.21 (0.13)	-0.14 (0.14)	-0.36 (0.2)	-0.62 ** (0.2)
Ind_Customer_Services	-0.41 ** (0.12)	-0.56 *** (0.13)	-0.75 *** (0.19)	-0.79 *** (0.18)
Ind_Information_Media_and_Telecommunications	0.69 *** (0.17)	0.21 (0.18)	0.9 *** (0.23)	0.32 (0.22)
Ind_Knowledge_Services	0.73 *** (0.12)	0.62 *** (0.13)	0.28 (0.18)	-0.2 (0.17)
Ind_Other_Services	0.09 (0.12)	0 (0.13)	-0.63 *** (0.18)	-0.56 ** (0.17)
Reg_inner_regional_australia	-0.14 (0.08)	0.04 (0.09)	-0.58 *** (0.15)	-0.15 (0.14)
Reg_outer_regional_and_remote_and_very_remote_australia	-0.16 (0.11)	-0.03 (0.12)	-0.36 (0.19)	-0.4 * (0.19)
Employee_Size_5_to_19_employees	0.75 *** (0.07)	0.58 *** (0.08)	0.42 ** (0.14)	0.58 *** (0.13)
Employee_Size_20_to_199_employees	1.2 *** (0.09)	1.32 *** (0.09)	1.47 *** (0.14)	1.01 *** (0.14)
Employee_Size_200_or_more_employees	1.73 *** (0.08)	2.37 *** (0.09)	3.13 *** (0.12)	1.92 *** (0.11)
N	5469	5469	5469	5469
McFadden's pseudo R-squared	0.09	0.14	0.25	0.10

a. ***, **, * respectively indicate statistically significant coefficient estimates at the 0.1, 1, 5% levels.

Source: Productivity Commission estimates using data in the ABS's Business Longitudinal Analysis Data Environment.

Table A.3 – Relationship between business characteristics and technology use (3)
Logistic regression results using 2019-20 Business Characteristics Survey data^a

	Artificial intelligence	3D Printing	Blockchain technology
Intercept	-3.99 *** (0.29)	-4.91 *** (0.45)	-5.9 *** (0.76)
Ind_Manufacturing	-0.17 (0.32)	1.28 ** (0.44)	0.45 (0.88)
Ind_Electricity_Water_and_Waste_Services	0.56 (0.37)	0.78 (0.55)	1.37 (0.88)
Ind_Construction	-1.08 * (0.46)	0.36 (0.53)	0.15 (1.01)
Ind_Supply_Chain_Logistics	-0.16 (0.3)	-0.13 (0.5)	0.53 (0.83)
Ind_Customer_Services	-1.1 *** (0.33)	-0.7 (0.52)	0.13 (0.83)
Ind_Information_Media_and_Telecommunications	1.05 ** (0.34)	0.34 (0.61)	2.08 ** (0.8)
Ind_Knowledge_Services	0.94 *** (0.27)	0.51 (0.44)	1.8 * (0.74)
Ind_Other_Services	-0.46 (0.28)	-0.62 (0.47)	0.02 (0.8)
Reg_inner_regional_australia	-0.79 ** (0.27)	-0.52 (0.38)	0.01 (0.39)
Reg_outer_regional_and_remote_and_very_remote_australia	-0.58 (0.34)	0.1 (0.39)	-0.58 (0.74)
Employee_Size_5_to_19_employees	0.59 ** (0.22)	0.81 ** (0.31)	0.77 * (0.34)
Employee_Size_20_to_199_employees	1.04 *** (0.24)	0.93 ** (0.35)	0.64 (0.44)
Employee_Size_200_or_more_employees	2.83 *** (0.18)	1.93 *** (0.27)	1.46 *** (0.32)
N	5469	5469	5469
McFadden's pseudo R-squared	0.21	0.10	0.08

a. ***, **, * respectively indicate statistically significant coefficient estimates at the 0.1, 1, 5% levels.

Source: Productivity Commission estimates using data in the ABS's Business Longitudinal Analysis Data Environment.

B. Stylised simulations of economy-wide effects

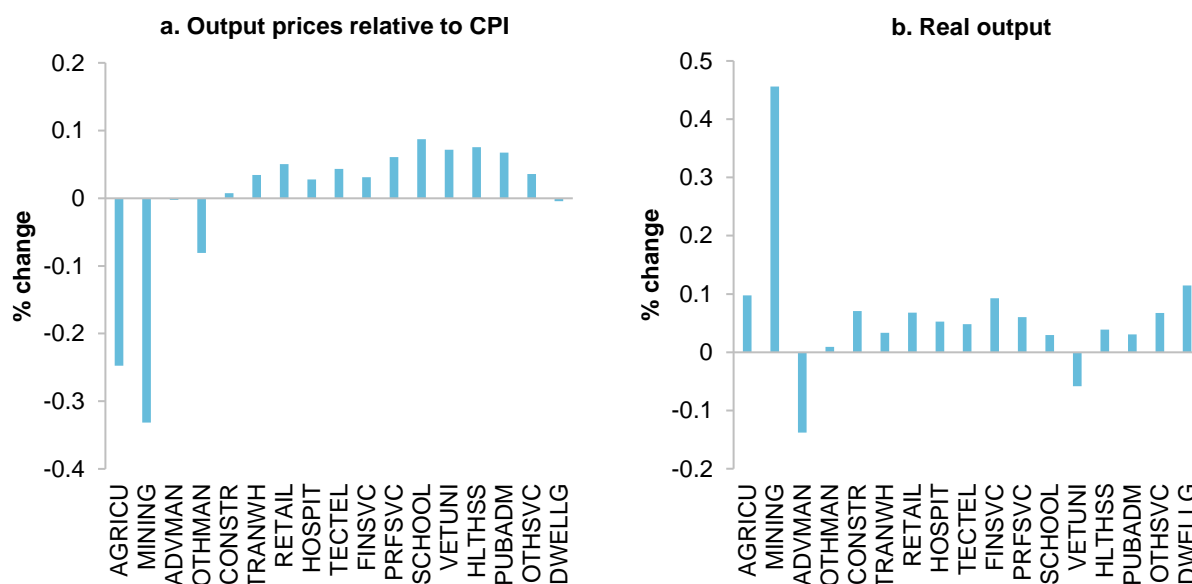
Regional and remote digital infrastructure¹⁹

The Commission used a whole-of-economy model to simulate the increased use of technology and data in regional and remote areas that could result from improved digital infrastructure. This model is static, in that it does not capture dynamic effects over time. Rather, the results are interpreted as if the effects of a shock to the economy could happen overnight. While the simulation is stylised and there is a high level of uncertainty in the impacts of the proposed recommendation and other model assumptions, the simulation provides insight on how potential productivity improvements could flow through the economy's structure and the differential impacts across industries and household types. Further details of the model, simulation and effects of sensitivity testing are contained in this inquiry's companion volume *Whole-of-economy modelling*.

In this simulation, the efficiency with which the 'mining' and 'agriculture, forestry and fishing' industries use labour and capital was increased such that they could produce 0.5% more output using the same quantity of labour and capital. While other industries operating in regional and remote areas are likely to benefit from improved digital infrastructure as well, shocks to 'mining' and 'agriculture, forestry and fishing' industries were simulated due to their much higher shares of labour (as a proxy for output) in regional and remote areas.

The increased productivity in the 'mining' and 'agriculture, forestry and fishing' industries resulted in a reduction in prices relative to the economy-wide consumer price index (CPI) of commodities produced by these industries (figure B.1, panel a) which, in turn, increased demand for their outputs. The increased demand came from both domestic and foreign consumption: on the latter, lower relative prices of commodities produced by the 'mining' and 'agriculture, forestry and fishing' industries meant that they were relatively cheaper in the foreign market, leading to an increase in the quantity of these commodities exported.

¹⁹ Referred to as simulation 2 in this inquiry's companion volume *Whole-of-economy modelling*.

Figure B.1 – Estimated change in output prices and real output by industry^a

a. Industry abbreviations: AGRICU – agriculture, forestry and fishing; MINING – mining; ADVMAN – advanced manufacturing; OTHMAN – other manufacturing; CONSTR – construction; TRANWH – transport and wholesale; RETAIL – retail trade; HOSPIT – hospitality; TECTEL – technology and telecommunications; FINSVC – financial services; PRFSVC – professional, scientific and technical services; SCHOOL – school education; VETUNI – technical, vocational and tertiary education; HLTHSS – health and social services; PUBADM – public administration; OTHSVC – other services; DWELLG – ownership of dwellings.

Source: Productivity Commission estimates.

The quantity of output produced grew across most industries, not only in the shocked industries (figure B.1, panel b), due to aggregate demand effects, for example through household consumption increasing due to higher incomes. However, this was not the case for the ‘advanced manufacturing’ and ‘technical, vocational and tertiary education’ industries due to their relatively higher export intensity and the model’s assumptions about fixed foreign investment.²⁰ Across the entire economy, real GDP and real gross national income increased by about 0.1% in this simulation. The magnitude of results depended on model and simulation assumptions; for example, sensitivity testing found that the real GDP effect ranged from about 0.04 to 0.20% with different assumed shock sizes, demonstrating the uncertainty in the simulations (chapter 4 of this inquiry’s companion volume *Whole-of-economy modelling*).

Labour used by the ‘mining’ and ‘agriculture, forestry and fishing’ industries decreased because they required less labour to produce the same amount of output. The increased demand for these commodities was not large enough to induce an overall increase in demand for labour in those industries. Across the economy, there was an overall increase in labour use and real wage rates (that is, wages relative to the economy-wide CPI) due to

²⁰ Exports were a relatively large share of demand for these industries’ outputs (making up about a quarter of the value of output before the simulated productivity increase). Assumptions in the model about fixed foreign investment mean that movements in the balance of trade are limited; therefore the increased exports of ‘mining’ and ‘agriculture, forestry and fishing’ commodities came with a fall in exports of other goods and services. For the ‘advanced manufacturing’ and ‘technical, vocational and tertiary education’ industries, these falls were greater than increases in domestic demand.

increased demand for other commodities. The increase in real wage rates contributed to the relative price increases for most industries that were not affected by the productivity shock.²¹

There was also an overall economy-wide increase in the capital stock. 'Mining' and 'agriculture, forestry and fishing' industries were relatively capital-intensive, so the productivity improvements in these industries led to proportionally large decreases in the need for capital in the economy to produce the same amount of output. However, this was mitigated by increased demand for capital arising from increased demand for goods and services across the economy, along with a lower relative price of investment and capital rental.

Households increased their real consumption of all commodities. The increase in real wage rates and overall labour use resulted in real labour income increasing across all age groups, genders and education levels, while the increased amount of capital held by households led to an increase in real capital income, despite relative falls in the capital rental price. These increases in income (which more than offset increases in saving and income taxes) meant that households increased their consumption of all other commodities, even with the majority of these commodities seeing relative price increases. Household wellbeing increased as a result of higher consumption, with the value of the increase estimated to be about \$1.1 billion in 2018-19 dollars (that is, if this amount was given as extra income instead of the productivity shock, households would be as well off as they were estimated to be after the productivity shock).

²¹ Relative prices of outputs produced by the 'other manufacturing' industry decreased (figure B.1, panel a). This industry relies relatively heavily on 'mining' and 'agriculture, forestry and fishing' outputs as intermediate inputs (which constituted about 25% of production costs before the simulation), so the falls in prices of these outputs flowed through to the price of 'other manufacturing' outputs.

Abbreviations

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACMA	Australian Communications and Media Authority
ACSC	Australian Cyber Security Centre
AI	Artificial Intelligence
ANZSCO	Australian and New Zealand Standard Classification of Occupations
ANZSIC	Australian and New Zealand Standard Industrial Classification
APRA	Australian Prudential Regulation Authority
ASD	Australian Signals Directorate
ATO	Australian Taxation Office
BLADE	Business Longitudinal Analysis Data Environment
CDR	Consumer Data Right
COVID-19	Coronavirus disease (an infectious disease caused by the SARS-CoV-2 virus)
CRM	Customer relationship management
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAT	Data Availability and Transparency
DP-REG	Digital Platform Regulators Forum
DRCF	Digital Regulation Cooperation Forum
EDI	Electronic data interchange
ERP	Enterprise resource planning
EU	European Union
GCCC	Government Cyber Coordination Centre
GDP	Gross Domestic Product
GP	General Practitioner
IT	Information Technology
IoT	Internet of Things
ICT	Information and Communication Technology
MADIP	Multi-Agency Data Integration Project
Mbps	Megabits per second
MBSP	Mobile Black Spot Program
MHR	My Health Record

NBN	National Broadband Network
NDIA	National Disability Insurance Agency
NDIS	National Disability Insurance Scheme
NSC	National Skills Commission
OAIC	Office of the Australian Information Commissioner
OECD	Organisation for Economic Co-operation and Development
PC	Productivity Commission
PHN	Primary health network
PIP QI	Practice Incentives Program Quality Improvement
RCP	Regional Connectivity Program
RFID	Radio-frequency identification
SaaS	Software-as-a-Service
SME	Small and medium enterprise
SOCI	Security of Critical Infrastructure
STP	Single Touch Payroll
TSS	Temporary Skill Shortage
UK	United Kingdom
UN	United Nations
US	United States
USG	Universal Service Guarantee
USO	Universal Service Obligation
VET	Vocational Education and Training

References

- ABS (Australian Bureau of Statistics) 2018, *Summary of IT Use and Innovation in Australian Business 2016-17*, Cat. no. 8166.0.
- 2021a, *Characteristics of Australian Business, 2019-20*, Cta. No. 8167.0.
- 2021b, *Characteristics of Australian Business methodology*, released 4 June.
- 2022a, *BLADE Research Projects*, <https://www.abs.gov.au/about/data-services/data-integration/integrated-data/business-longitudinal-analysis-data-environment-blade/blade-research-projects> (accessed 17 May 2022).
- 2022b, *Digital activity in the Australian economy, 2020-21*, <https://www.abs.gov.au/articles/digital-activity-australian-economy-2020-21> (accessed 7 December 2022).
- 2022c, *Multi-Agency Data Integration Project (MADIP) Research Projects*, <https://www.abs.gov.au/about/data-services/data-integration/integrated-data/multi-agency-data-integration-project-madip/multi-agency-data-integration-project-madip-research-projects> (accessed 17 May 2022).
- nd, *Deregulation at the ABS*, <https://www.abs.gov.au/about/key-priorities/deregulation-abs> (accessed 16 May 2022).
- Abu-Khalaf, J. and Haskell-Dowland, P. 2021, 'The self-driving trolley problem: how will future AI systems make the most ethical choices for all of us?', *The Conversation*.
- Academy Xi 2022, *Online courses*, <https://academyxi.com/online-courses/> (accessed 17 May 2022).
- ACCC (Australian Competition and Consumer Commission) 2007, *Submission to the DCITA review of the universal service obligation (USO)*, November.
- 2016, *ACCC submission to the Productivity Commission's Issues Paper on the Telecommunications Universal Service Obligation*, July.
- 2020, *Report on modelling of the Regional Broadband Scheme levy initial base component*, October.
- 2021a, *Internet Activity Report: For the period ending 30 June 2021*, December.
- 2021b, *Mobile Infrastructure Report 2021*, December.
- 2021c, *Mobile network investment continues but focus is on 5G in major cities*, <https://www.accc.gov.au/media-release/mobile-network-investment-continues-but-focus-is-on-5g-in-major-cities> (accessed 13 May 2022).
- 2021d, *Superfast Broadband Access Service and Local Bitstream Access Service declaration inquiry: Final Decision*.
- 2021e, *Targeting scams: Report of the ACCC on scams activity 2020*, June.
- 2022a, *ACCC launches CDR Sandbox to assist participant design, build & testing*, <https://www.accc.gov.au/media-release/accc-launches-cdr-sandbox-to-assist-participant-design-build-testing> (accessed 25 July 2022).
- 2022b, *ACCC'S Post: Waave Technologies joins the Consumer Data Right as an accredited data recipient*, https://www.linkedin.com/posts/acccgovau_become-an-accredited-data-recipientconsumer-activity-7008996803119390721-jOWF (accessed 16 December 2022).
- 2022c, *Communique - Digital Platforms Regulators Forum*, <https://www.accc.gov.au/update/communique-digital-platforms-regulators-forum> (accessed 29 June 2022).
- 2022d, *Digital platform services inquiry: Interim report No. 5 – Regulatory reform*, <https://www.accc.gov.au/system/files/Digital%20platform%20services%20inquiry%20-%20September%202022%20interim%20report.pdf> (accessed 10 December 2022).
- 2022e, *Infrastructure record keeping rules: Project overview*, <https://www.accc.gov.au/regulated-infrastructure/communications/monitoring-reporting/infrastructure-record-keeping-rules> (accessed 13 May 2022).
- 2022f, *Internet Activity Report: For the period ending 30 June 2022*, 5 December, <https://www.accc.gov.au/regulated-infrastructure/telecommunications-and-internet/telecommunications-industry-record-keeping-and-reporting-rules/internet-activity-record-keeping-rule/june-2022-report> (accessed 8 December 2022).
- 2022g, *Measuring Broadband Australia - Report 17, June 2022*, Report 17, June, prepared by SamKnows.
- 2022h, *Mobile Infrastructure Report 2022*, September, <https://www.accc.gov.au/system/files/Mobile%20Infrastructure%20Report%202022.pdf> (accessed 8 December 2022).
- 2022i, *Scamwatch*, <https://www.scamwatch.gov.au/> (accessed 7 July 2022).
- Accenture 2021, *Consumer affordability of NBN services*, September.
- 2022, *Cyber Threat Intelligence Report - volume 2 - 2021*.
- ACMA (Australian Communications and Media Authority) 2021a, *About the Regional Broadband Scheme*, <https://www.acma.gov.au/about-regional-broadband-scheme> (accessed 15 June 2022).
- 2021b, *Starlink Licence Details*, https://web.acma.gov.au/rrl/licence_search/licence_lookup?pLICENCE_NO=11181002/2 (accessed 13 May 2022).
- ACOSS (Australian Council of Social Service) 2016, *Staying connected: the impact of digital exclusion on people living on low-incomes and the community organisations that support them*, January.
- ACS (Australian Computer Society) 2020, *ACS Australia's Digital Pulse: Unlocking the potential of Australia's technology workforce*, Deloitte Access Economics, Sydney.
- 2021a, *ACS Australia's Digital Pulse: Future directions for Australia's Technology workforce*, Deloitte Access Economics, Sydney.
- 2021b, *Demand & Impacts on Tech & Digital Skills*, August.
- 2021c, *The Ethics and Risks of AI Decision-Making*, June.
- ACSC (Australian Cyber Security Centre) 2020, *Step-by-step guides*, <https://www.cyber.gov.au/acsc/individuals-and-families/step-by-step-guides> (accessed 25 May 2022).
- 2021a, *ACSC Annual Cyber Threat Report: 1 July 2020 to 30 June 2021*.

- 2021b, *Cyber Supply Chain Risk Management*, <https://www.cyber.gov.au/acsc/view-all-content/publications/cyber-supply-chain-risk-management> (accessed 1 June 2022).
- 2021c, *Essential Eight*, <https://www.cyber.gov.au/acsc/view-all-content/essential-eight> (accessed 25 May 2022).
- 2021d, *Ransomware Attacks: Emergency Response Guide*.
- 2022a, *ACSC Annual Cyber Threat Report: July 2021 to June 2022*, <https://www.cyber.gov.au/acsc/view-all-content/reports-and-statistics/acsc-annual-cyber-threat-report-july-2021-june-2022> (accessed 8 December 2022).
- 2022b, *Information Security Manual*, 10 March.
- ADHA (Australian Digital Health Agency) 2021, *ePIP Conformance Register*, <https://www.digitalhealth.gov.au/sites/default/files/documents/e-pip-conformance-register.pdf> (accessed 6 December 2022).
- 2022, *My Health Record: Statistics and Insights*, <https://www.digitalhealth.gov.au/initiatives-and-programs/my-health-record/statistics> (accessed 16 May 2022).
- nd, *ePIP incentive eligibility requirements*, <https://myhealthrecord.gov.au/for-healthcare-professionals/epip-incentive-eligibility-requirements> (accessed 6 December 2022).
- ADII (Australian Digital Inclusion Index) 2021, *Case study: Taking a deep dive into Digital Ability*.
- 2022, *Explore the interactive data dashboards*, <https://www.digitalinclusionindex.org.au/interactive-data-dashboards/> (accessed 18 May 2022).
- Agarwal, A., Singhal, C. and Thomas, R. 2021, *AI-powered decision making for the bank of the future*, McKinsey & Company.
- AGD (Attorney-General's Department) 2021, *Privacy Act Review: Discussion Paper*, October.
- nd, *Protective Security Policy Framework*, <https://www.protectivesecurity.gov.au/> (accessed 1 June 2022).
- Aleisa, N., Renaud, K. and Bongiovanni, I. 2020, 'The privacy paradox applies to IoT devices too: A Saudi Arabian study', Elsevier, *Computers & Security*, vol. 96, p. 101897.
- Alismailli, S.Z., Li, M., Shen, J., Huang, P., He, Q. and Zhan, W. 2020, 'Organisational-level assessment of cloud computing adoption: Evidence from the Australian SMEs', *Journal of Global Information Management*, vol. 28, no. 2, pp. 73–89.
- AlphaBeta 2019a, *Australia's Digital Opportunity: Growing A \$122 Billion A Year Tech Industry*, September.
- 2019b, *Speed Check: Calibrating Australia's broadband speeds*, October.
- Andal, S., Brown, A.-L., Grobler, D.M. and Richelle, R. 2022, *Small but stronger: Lifting SME cyber security in South Australia*, CSCRC, CSIRO's Data61, CyberCX.
- Antonelli, W. 2022, 'What's a good internet speed? How to upgrade your internet setup to fit your needs', *Business Insider*.
- APRA (Australian Prudential Regulation Authority) 2019, *Prudential Standard CPS 234: Information Security*, July.
- ASD (Australian Signals Directorate) 2021, *Australian Signals Directorate Annual Report 2020–21: Key Activity 2 Cyber security services*, September.
- Atlassian 2022, *Our distributed workforce*, <https://www.atlassian.com/practices/use-cases/team-anywhere> (accessed 18 May 2022).
- ATO (Australian Taxation Office) 2019, *Digital Partnership Office (DPO)*, <https://softwaredevelopers.ato.gov.au/DPO> (accessed 16 May 2022).
- 2021a, *Micro employers*, <https://www.ato.gov.au/business/single-touch-payroll/concessional-reporting/micro-employers/> (accessed 16 June 2022).
- 2021b, *Seasonal and intermittent employers*, <https://www.ato.gov.au/Business/Single-Touch-Payroll/In-detail/Seasonal-and-intermittent-employers/> (accessed 16 June 2022).
- 2021c, *Single Touch Payroll*, <https://www.ato.gov.au/business/single-touch-payroll/> (accessed 16 June 2022).
- 2022, *Product Register*, [https://softwaredevelopers.ato.gov.au/product-register#Functionality=*Payroll%20\(STP\)](https://softwaredevelopers.ato.gov.au/product-register#Functionality=*Payroll%20(STP)) (accessed 17 May 2022).
- Attwooll, J. 2022, *Pandemic prompts massive spike in My Health Record use*, <https://www1.racgp.org.au/newsgp/professional/pandemic-prompts-massive-spike-in-my-health-record> (accessed 5 December 2022).
- AustCyber 2020, *Australia's Cyber Security Sector Competitiveness Plan 2020*, 29 November.
- Australian Government 2015, *The cost of cybercrime to Australia*, https://www.infrastructure.gov.au/sites/default/files/Cost%20of%20cybercrime_INFOGRAPHIC_WEB_published_08102015.pdf (accessed 7 July 2022).
- 2021a, *Consumer Data Right: Phasing in the banking sector*, <https://www.cdr.gov.au/sites/default/files/2021-08/CDR-Phasinginthebankingsector.pdf> (accessed 30 May 2022).
- 2021b, *Mobile Blackspot Database*, <https://data.gov.au/dataset/ds-nsw-4b681b2d-d7aa-4d60-94ee-bea51e52b82d/details?q=mobile%20black%20spot> (accessed 13 May 2022).
- 2022, *Consumer Data Right: Performance*, <https://www.cdr.gov.au/performance> (accessed 4 July 2022).
- nd, *Where to use it, myGovID*, <https://www.mygovid.gov.au/where-to-use> (accessed 24 November 2022).
- Awad, E., Dsouza, S., Kim, R., Schulz, J., Henrich, J., Shariff, A., Bonnefon, J.-F. and Rahwan, I. 2018, 'The moral machine experiment', *Nature*, vol. 563, no. 7729, pp. 59–64.
- AWS 2022, *AWS Certification*, <https://aws.amazon.com/certification/> (accessed 17 May 2022).
- Barbaschow, A. 2021a, 'Critical infrastructure Bill has a government "step in" powers labelling problem', *ZDNet*.
- 2021b, 'Logistics and utilities providers agree to help from ASD in the event of a cyber incident', *ZDNet*.
- Barth, S. and De Jong, M.D. 2017, 'The privacy paradox—Investigating discrepancies between expressed privacy concerns and actual online behavior—A systematic literature review', Elsevier, *Telematics and informatics*, vol. 34, no. 7, pp. 1038–1058.
- Basu, S., Fernald, J.G. and Kimball, M.S. 2006, 'Are technology improvements contractionary?', *American Economic Review*, vol. 96, no. 5, pp. 1418–1448.
- BCARR (Bureau of Communications, Arts and Regional Research) 2021, *Working paper - Economic impact of ubiquitous high speed broadband: agriculture sector*, May, Commonwealth of Australia, Canberra, ACT.
- Beauoyer, E., Dupéré, S. and Guitton, M. 2020, 'COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies', *Computers in Human Behavior*, vol. 111, October 2020, p. 106424.
- Bennett, T. and Davidson, J. 2022, *Government pushes for digital identity system after Optus hack*, Australian Financial Review, <https://www.afr.com/technology/government-pushes->

- for-digital-identity-system-after-optus-hack-20220928-p5blrf (accessed 24 November 2022).
- Blackburn, S., Freeland, M. and Gärtner, D. 2017, *Digital Australia: Seizing opportunities from the Fourth Industrial Revolution*, March, McKinsey & Company, Sydney.
- Blease, C., Torous, J. and Häggglund, M. 2020, 'Does patient access to clinical notes change documentation?', *Frontiers Media SA, Frontiers in Public Health*, vol. 8, p. 577896.
- Bloom, N., Sadun, R. and Reenen, J.V. 2012, 'Americans do it better: US multinationals and the productivity miracle', *American Economic Review*, vol. 102, no. 1, pp. 167–201.
- BoCAR (Bureau of Communications and Arts Research) 2020, *Demand for fixed-line broadband in Australia 2018–2028: Working Paper*, July, Department of Industry, Science, Energy and Resources, Commonwealth of Australia, Canberra.
- Bongiovanni, I., Renaud, K. and Aleisa, N. 2020, *The privacy paradox: we claim we care about our data, so why don't our actions match?*, The Conversation, <http://theconversation.com/the-privacy-paradox-we-claim-we-care-about-our-data-so-why-dont-our-actions-match-143354> (accessed 16 December 2022).
- Borowiecki, M., Pareliussen, J., Glocker, D., Kim, E.J., Polder, M. and Rud, I. 2021, *The Impact of Digitalisation on Productivity: Firm-Level Evidence from the Netherlands*, OED Economics Department Working Papers, No. 1680, 9 August, OECD Publishing, Paris.
- Bova, F., Goldfarb, A. and Melko, R. 2021, 'Quantum Computing Is Coming. What Can It Do?', *Harvard Business Review*.
- Bowman, K. and Callan, V.J. 2021, *Engaging More Employers in Nationally Recognised Training to Develop their Workforce*, National Centre for Vocational Education Research, Adelaide.
- Boyd, T. 2021, 'NBN's monopoly getting stronger', *Australian Financial Review*, 29 April.
- Boyton, A. 2022, *Australian Business Economists Speech by the National Skills Commissioner*, 14 February.
- Braue, D. 2022, '4 in 10 CISOs unprepared to stop attacks', *Information Age*, 17 May.
- Brennan, M. 2021, *Reform and Sustainable Funding of Healthcare*, Productivity Commission Chairman's Speech, 3 August, Healthcare Leaders Forum.
- Bresnahan, T.F. and Trajtenberg, M. 1995, 'General purpose technologies "Engines of growth"?' Elsevier, *Journal of Econometrics*, vol. 65, no. 1, pp. 83–108.
- Brynjolfsson, E. and Hitt, L.M. 2000, 'Beyond computation: Information technology, organizational transformation and business performance', *Journal of Economic perspectives*, vol. 14, no. 4, pp. 23–48.
- Buckley, R.P., Jevglevska, N. and Farrell, S. 2022, 'Australia's data-sharing regime: Six lessons for Europe', *King's Law Journal*, vol. 33, no. 1, pp. 61–91.
- Burns, D. 2022, *Our role connecting millions of Australians from space*, 2 February, Telstra.
- Burton, T. 2022a, *Digital Transformation Agency plots a new path to help build digital government*, *Australian Financial Review*, <https://www.afr.com/politics/federal/digital-transformation-agency-plots-a-new-path-20221006-p5bnp6> (accessed 24 November 2022).
- 2022b, 'New myGov app to be platform for public and private services', *Australian Financial Review*, 5 December, <https://www.afr.com/politics/federal/new-mygov-app-to-be-platform-for-public-and-private-services-20221205-p5c3od> (accessed 5 December 2022).
- Cabinet Office 2022, *Government Cyber Security Strategy: 2022 to 2030*, 17 February.
- California Policy Lab nd, *What we do*, <https://www.capolicylab.org/what-we-do/> (accessed 16 May 2022).
- Catania, P., Wheelahan, F. and Mani, K. 2022, *New public sector data sharing laws: key considerations for the private sector*, <https://www.corrs.com.au/insights/new-public-sector-data-sharing-laws-key-considerations-for-the-private-sector> (accessed 27 May 2022).
- CBA (Commonwealth Bank of Australia) 2022, *Bill Sense*, <https://www.commbank.com.au/digital-banking/bill-sense.html> (accessed 18 May 2022).
- CDDO (Central Digital and Data Office) 2020, *Data Ethics Framework*, <https://www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework-2020> (accessed 1 June 2022).
- CEDA 2017, *Australians acting in a contradictory manner with data privacy*, <https://www.ceda.com.au/NewsAndResources/News/Data-Digital-economy/Australians-acting-in-a-contradictory-manner-with> (accessed 16 December 2022).
- 2022, *AI Principles to Practice*.
- Chakravorti, B., Bhalla, A. and Chaturvedi, R.S. 2019, 'Which Countries Are Leading the Data Economy?', *Harvard Business Review*.
- Chatwood, R. and Allen, B. 2019, *Australia suddenly passes new laws regulating streaming of abhorrent violent material by ISPs and other content providers*, <https://www.dentons.com/en/insights/alerts/2019/april/15/australia-suddenly-passes-new-laws-regulating-streaming-of-abhorrent-violent-material> (accessed 31 May 2022).
- Cheu, S. 2021, 'Aged care provider uptake of My Health Record remains low', *Australian Ageing Agenda*.
- Christie, A. and Wong, J. 2021, *Australian governments agree to sharing of public sector data between them as 'default position'*, 27 July, Clyde & Co.
- Chui, M., Farrell, D. and Jackson, K. 2014, *How Government can promote open data and help unleash over \$3 trillion in economic value*, McKinsey, 1 April.
- CISC (Cyber and Infrastructure Security Centre) 2022a, *Cyber Security Incident Reporting*, April.
- 2022b, *Legislative information and reforms: Critical infrastructure*, <https://www.cisc.gov.au/legislative-information-and-reforms/critical-infrastructure> (accessed 3 June 2022).
- Cisco 2022, *Cisco Certifications*, <https://www.cisco.com/c/en/us/training-events/training-certifications/certifications.html> (accessed 17 May 2022).
- Clark, J. 2016, *What is the Internet of Things (IoT)?*, <https://www.ibm.com/blogs/internet-of-things/what-is-the-iot/> (accessed 15 June 2022).
- CMA (Competition and Markets Authority) 2021, *A joined-up approach to digital regulation: Digital Regulation Cooperation Forum publishes its first annual plan of work*, 10 March.
- CompTIA 2020, *The Role of Emerging Technology in Digital Transformation*, CompTIA Worldwide Headquarters, Chicago, Illinois.
- Coursera 2021, *Google launches three new entry-level Professional Certificates on Coursera*, <https://blog.coursera.org/>

- google-launches-three-new-entry-level-professional-certificates-on-coursera/ (accessed 27 July 2022).
- Coyle, D. and Manley, A. 2022, *What is the Value of Data? A review of empirical methods*, July, Bennett Institute for Public Policy, Cambridge.
- CPA Australia 2021, *Business Technology Report 2021*.
- Crozier, R. 2021, 'HyperOne to deploy \$1.5bn, 20,000 km fibre backbone across Australia', *IT News*.
- CRTC (Canadian Radio-television and Telecommunications Commission) 2020, *Measuring Broadband Canada Project*, <https://crtc.gc.ca/eng/internet/proj.htm> (accessed 6 June 2022).
- CyberEdge 2021, *2021 Cyberthreat Defense Report*, CyberEdge Group.
- 2022, *2022 Cyberthreat Defense Report*, CyberEdge Group, <https://cyber-edge.com/cdr/> (accessed 8 December 2022).
- Cynch Security, Deakin University, RMIT University and AustCyber 2021, *Big cyber security questions for small business: The state of cyber fitness in Australian small businesses*, Cynch Security, Melbourne.
- DAE (Deloitte Access Economics) 2019a, *Benefits of small business digital engagement*.
- 2019b, *The Economic Value of Cloud Services in Australia*.
- Data Republic 2020, *Inquiry into Future Directions for the Consumer Data Right*, April.
- Davenport, T.H. and Mittal, N. 2020, 'How CEOs Can Lead a Data-Driven Culture', *Harvard Business Review*.
- DAWE (Department of Agriculture, Water and the Environment) 2022, *Food Safety Recognition Agreements (Arrangements) with other countries*, <https://www.awe.gov.au/biosecurity-trade/export/from-australia/food-safety-recognition-agreements> (accessed 27 June 2022).
- Dawson, D., Schleiger, E., Horton, J., McLaughlin, J., Robinson, C., Quezada, G., Scowcroft, J. and Hajkovicz, S. 2019, *Artificial intelligence: Australia's ethics framework-a discussion paper*, Data61 CSIRO.
- DCA (Department of Communications and the Arts) 2018, *Development of the Universal Service Guarantee: Summary Report*, November.
- DeakinCo and Deloitte Access Economics 2022, *The Business Return On Learning And Development*, March, Deakin University, Melbourne.
- Defence (Department of Defence) 2020, *Nation's largest ever investment in cyber security*, 30 June.
- DeFilippis, E., Impink, S.M., Singell, M., Polzer, J.T. and Sadun, R. 2020, *Collaborating during coronavirus: The impact of COVID-19 on the nature of work*, Working Paper 27612, National Bureau of Economic Research, United States.
- Deloitte Insights 2019, *Future in the balance? How countries are pursuing an AI advantage*, Deloitte Center For Technology, Media & Telecommunications, New York.
- Delua, J. 2021, *Supervised vs. Unsupervised Learning: What's the Difference?*, <https://www.ibm.com/cloud/blog/supervised-vs-unsupervised-learning> (accessed 1 June 2022).
- Department of Health 2019, *Practice Incentives Program Quality Improvement Incentive Guidelines*.
- DESE (Department of Education, Skills and Employment) 2021, *Higher Education Data Cube (uCube)*, <http://highereducationstatistics.education.gov.au/> (accessed 8 June 2022).
- 2022, *Award Course Completions Pivot Table*, <https://www.dese.gov.au/higher-education-statistics/resources/award-course-completions-pivot-table> (accessed 8 June 2022).
- DISER (Department of Industry, Science, Energy and Resources) 2021, *Cyber Security Assessment Tool*, https://digitaltools.business.gov.au/jfe/form/SV_0dnd9cF1518LnH8?ref=bga (accessed 28 June 2022).
- nd, *Australia's Artificial Intelligence Ethics Framework: Testing the AI Ethics Principles*, <https://www.industry.gov.au/data-and-publications/australias-artificial-intelligence-ethics-framework/testing-the-ai-ethics-principles> (accessed 1 June 2022).
- DISR (Department of Industry, Science, and Resources) 2019, *Australia's Artificial Intelligence Ethics Framework*, <https://www.industry.gov.au/data-and-publications/australias-artificial-intelligence-ethics-framework> (accessed 1 June 2022).
- DITRDC (Department of Infrastructure, Transport, Regional Development and Communications) 2019, *Regional Tech Hub*, www.infrastructure.gov.au/media-technology-communications/internet/regional-tech-hub (accessed 8 June 2022).
- 2020, *NBN - Fixed-wireless*, <https://data.gov.au/data/dataset/national-broadband-network-connections-by-technology-type/resource/5230f085-2395-4e6e-8d4f-fc7721fb5510> (accessed 2 June 2022).
- 2021a, *Mobile Black Spot Program*, <https://www.infrastructure.gov.au/media-technology-communications/phone/mobile-services-coverage/mobile-black-spot-program> (accessed 12 May 2022).
- 2021b, *Universal Service Guarantee – fact sheet*, 3 September.
- 2022a, *NBN fixed wireless receives major budget boost*, <https://www.infrastructure.gov.au/department/media/news/nbn-fixed-wireless-receives-major-budget-boost> (accessed 13 May 2022).
- 2022b, *Regional Connectivity Program*, <https://www.infrastructure.gov.au/media-communications-arts/internet/regional-connectivity-program> (accessed 12 May 2022).
- 2022c, *Spectrum allocations*, <https://www.infrastructure.gov.au/media-communications-arts/spectrum/spectrum-allocations> (accessed 26 July 2022).
- DJPR (Victorian Department of Jobs, Precincts and Regions) 2022, *Digital Jobs: Building Victoria's digital workforce*, <https://djpr.vic.gov.au/digital-jobs> (accessed 8 June 2022).
- DLA Piper 2022, *Breach Notification: United States*, <https://www.dl Piperdataprotection.com/index.html?t=breach-notification&c=US> (accessed 1 June 2022).
- Dobscha, S.K., Denneson, L.M., Jacobson, L.E., Williams, H.B., Cromer, R. and Woods, S. 2016, 'VA mental health clinician experiences and attitudes toward OpenNotes', Elsevier, *General hospital psychiatry*, vol. 38, pp. 89–93.
- Domeyer, A., Hieronimus, S., Klier, J. and Weber, T. 2021, *Government data management for the digital age*, 20 September, McKinsey & Company.
- DP-REG (Digital Platform Regulators Forum) 2022, *Digital Platform Regulators Forum (DP-REG): Terms of Reference*, March.

- DRCF (Digital Regulation Cooperation Forum) 2022, *Digital Regulation Cooperation Forum: Annual report 2021 to 2022*, 28 April.
- DSO (Digital Skills Organisation) 2021, *Projects: Train 100 Data Analysts*, <https://digitalskillsorg.com.au/t100/> (accessed 8 June 2022).
- DSS (Department of Social Services) 2021, *Be Connected – improving digital literacy for older Australians*, <https://www.dss.gov.au/seniors/be-connected-improving-digital-literacy-for-older-australians> (accessed 8 June 2022).
- DTA (Digital Transformation Agency) 2021, *Hardening Government IT (HGIT) Initiative*, <https://www.dta.gov.au/our-projects/hardening-government-it-hgit-initiative> (accessed 1 June 2022).
- 2022a, *Digital Identity Legislation Background Paper*, Digital Identity Australian Government, <https://digitalidentity.gov.au> (accessed 24 November 2022).
- 2022b, *Trusted Digital Identity Framework (TDIF)*, Digital Identity Australian Government, <https://www.digitalidentity.gov.au/tdif> (accessed 24 November 2022).
- nd, *Digital Service Standard criteria: 5. Make it secure*, <https://www.dta.gov.au/help-and-advice/digital-service-standard/digital-service-standard-criteria/5-make-it-secure> (accessed 1 June 2022).
- Duch-Brown, N., Martens, B. and Mueller-Langer, F. 2017, *The Economics of Ownership, Access and Trade in Digital Data*, JRC Digital Economy Working Paper 2017-01, European Commission.
- EC (European Commission) 2021a, *Broadband Coverage in Europe 2013-2020*, <https://ec.europa.eu/newsroom/dae/redirection/document/80627> (accessed 6 June 2022).
- 2021b, *Ethics By Design and Ethics of Use Approaches for Artificial Intelligence*, 25 November.
- 2021c, *Proposal for a Regulation of the European Parliament and of the Council Laying down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts*.
- 2022, *Shaping Europe's digital future: Regulatory framework proposal on artificial intelligence*, <https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai> (accessed 1 June 2022).
- Eggers, W., Turley, M. and Kishnani, P.K. 2018, *The future of regulation Principles for regulating emerging technologies*, 19 June, Deloitte Insights.
- EIPA (European Institute of Public Administration) 2021, *The Artificial Intelligence Act Proposal and its Implications for Member States*, <https://www.eipa.eu/publications/briefing/the-artificial-intelligence-act-proposal-and-its-implications-for-member-states/> (accessed 1 June 2022).
- Eitel-Porter, R. 2021, 'Beyond the promise: implementing ethical AI', *AI and Ethics*, vol. 1, no. 1, pp. 73–80.
- Estcourt, D. and Eddie, R. 2022, "'Absolute authority": Call to halt plan to collect all Victorians' medical records', *The Age*, 11 March.
- Eyers, J. 2022a, 'ACCC warns banks on delivery of consumer data right', *Australian Financial Review*, 2 June.
- 2022b, 'Banks will use open data to assess loans this year', *Australian Financial Review*, 11 April.
- Farrell, S. 2020, *Future Directions for the Consumer Data Right*, October, Commonwealth of Australia, Canberra.
- FCA (Federal Court of Australia) 2022, *Australian Securities and Investments Commission v RI Advice Group Pty (Judgement Summaries)*, 5 May.
- FCC (Federal Communications Commission) 2021, *Measuring Fixed Broadband - Eleventh Report*, 31 December.
- 2022, *Chairwoman Rosenworcel Proposes To Increase Minimum Broadband Speeds And Set Gigabit Future Goal*, Media release, 15 July.
- Featherstone, D., Ormond-Parker, L. and Holcombe-James, I. 2022, *Mapping the Digital Gap: Wilcannia NSW Community Outcomes report 2022*, June, ARC Centre of Excellence for Automated Decision Making and Society: RMIT University, Melbourne.
- Fifth Quadrant, Ethical AI Advisory and Gradient Institute 2021, *Responsible AI Index Report*.
- Fogg, B. 2022, *Starlink in Australia: SpaceX's satellite internet explained*, <https://www.reviews.org/au/internet/starlink-satellite-internet-australia/> (accessed 13 May 2022).
- Forrest, C. 2017, *66% of SMBs would shut down or close if they experienced a data breach*, <https://www.techrepublic.com/article/66-of-smb-would-shut-down-or-close-if-they-experienced-a-data-breach/> (accessed 7 July 2022).
- Francom, S.R. 2020, *How Fast Should My Business Internet Be?*, <https://www.business.org/services/internet/business-internet-speed/> (accessed 20 May 2022).
- Gal, P., Nicoletti, G., Renault, T., Sorbe, S. and Timiliotis, C. 2019, *Digitalisation and productivity: In search of the holy grail – Firm-level empirical evidence from EU countries*, OECD Economics Department Working Papers 1533, 12 February.
- Gartner 2021, *Gartner Survey Reveals Talent Shortages as Biggest Barrier to Emerging Technologies Adoption*, 13 September, Stamford, Conn.
- General Assembly 2022, *Course Catalog*, <https://generalassemb.ly/browse?format=all> (accessed 17 May 2022).
- Gillespie, N., Lockey, S. and Curtis, C. 2020, *Trust in Artificial Intelligence: Australian Insights*, The University of Queensland and KPMG Australia.
- Gillezeau, N. 2020, 'The quietly rising power of product managers', *Australian Financial Review*, 2 December.
- Goldfarb, A. and Tucker, C. 2019, 'Digital economics', *Journal of Economic Literature*, vol. 57, no. 1, pp. 3–43.
- GovLab 2017a, *California Policy Lab (CPL)*, <https://medium.com/data-labs/california-policy-lab-cpl-b926603765dc> (accessed 16 May 2022).
- 2017b, *Ministry of Justice Data Lab*, <https://medium.com/data-labs/ministry-of-justice-data-lab-8d8b0779c295> (accessed 16 May 2022).
- Govtech Review 2021, 'Public sector IT spend to grow 8.8% in 2022'.
- Griffith, C. 2022, 'Telstra, OneWeb in deal on satellites', *The Australian*, 2 March.
- Gutierrez, A., Boukrami, E. and Lumsden, R. 2015, 'Technological, organisational and environmental factors influencing managers' decision to adopt cloud computing in the UK', *Journal of Enterprise Information Management*, vol. 28, no. 6, pp. 788–807.
- Haecck, P. 2021, 'Ex-Google boss slams transparency rules in Europe's AI bill', *Politico*.

- Hambur, J., Montaigne, M., Parsons, S. and Whalan, E. 2022, *Looking Under the Lamppost or Shining a New Light: New Data for Unseen Challenges*, February, p. 15.
- Havard, V., Jeanne, B., Lacomblez, M. and Baudry, D. 2019, 'Digital twin and virtual reality: a co-simulation environment for design and assessment of industrial workstations', *Production and Manufacturing Research*, vol. 7, no. 1, pp. 472–489.
- Health Metrics 2021, *Interoperable Software Key to Uptake of My Health Record*, <https://healthmetrics.com.au/my-health-record-aged-care/> (accessed 16 May 2022).
- Hendrie, D. 2019, 'Is My Health Record becoming useful to GPs?', *News GP*.
- Hendry, J. 2022, *Digital ID could prevent Optus breach repeat: Home Affairs*, InnovationAus.com, <https://www.innovationaus.com/digital-id-could-prevent-optus-breach-repeat-home-affairs/> (accessed 24 November 2022).
- Hirschhorn, J. 2021, *Digital transformation – Australia as a world leader*, 1 September.
- Home Affairs (Department of Home Affairs) 2020a, Australia's Cyber Security Strategy 2020.
- 2020b, *Protecting Critical Infrastructure and Systems of National Significance: Consultation Paper*, August.
- 2021a, *2020 – 21 Migration Program Report: Program year to 30 June 2021*.
- 2021b, *Ransomware Action Plan*.
- 2021c, *Skilled occupation list*, <https://immi.homeaffairs.gov.au/visas/working-in-australia/skill-occupation-list> (accessed 24 February 2022).
- 2021d, *Temporary Skill Shortage visa*, <https://immi.homeaffairs.gov.au/visas/getting-a-visa/visa-listing/temporary-skill-shortage-482> (accessed 18 May 2022).
- 2021e, *Visas for innovation: Global Talent Employer Sponsored program*, <https://immi.homeaffairs.gov.au/visas/working-in-australia/visas-for-innovation/global-talent-scheme> (accessed 18 May 2022).
- 2021f, *Visas for innovation: Global Talent Visa Program*, <https://immi.homeaffairs.gov.au/visas/working-in-australia/visas-for-innovation/global-talent-independent-program> (accessed 18 May 2022).
- 2022a, *Engagement on critical infrastructure reforms*, <https://www.homeaffairs.gov.au/reports-and-publications/submissions-and-discussion-papers/protecting-our-critical-infrastructure-reforms-engagement> (accessed 25 May 2022).
- 2022b, *Nominating a position: List of current labour agreements*, <https://immi.homeaffairs.gov.au/visas/employing-and-sponsoring-someone/sponsoring-workers/nominating-a-position/labour-agreements/list-of-current-labour-agreements> (accessed 18 May 2022).
- Huang, K., Pearson, K. and Madnick, S. 2021, 'Is Third-Party Software Leaving You Vulnerable to Cyberattacks?', *Harvard Business Review*.
- Huawei and Oxford Economics 2017, *Digital Spillover: Measuring the true impact of the digital economy*.
- IA (Infrastructure Australia) 2022a, *Delivering Outcomes: A roadmap to improve infrastructure industry productivity and innovation*, March.
- 2022b, *Regional Strengths and Infrastructure Gaps*, March.
- 2022c, *Regional Strengths and Infrastructure Gaps: Interactive Map*, <https://www.infrastructureaustralia.gov.au/regional-strengths-map> (accessed 7 July 2022).
- IBM 2021, *Cost of a Data Breach Report 2021*, July, IBM Corporation, Armonk, NY.
- nd, *What is blockchain technology?*, <https://www.ibm.com/au-en/topics/what-is-blockchain> (accessed 15 June 2022a).
- nd, *What is quantum computing?*, <https://www.ibm.com/topics/quantum-computing> (accessed 18 May 2022b).
- IDCARE 2022, *IDCARE Subscriber Organisations*, <https://www.idcare.org/about-idcare/our-subscribing-organisations> (accessed 7 July 2022).
- Internet Australia 2021, *Submission to the Regional Telecommunications Review 2021*, 30 September.
- Jackson, K. 2000, *The Telecommunications Universal Service Obligation (USO)*, https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/Publications_Archive/archive/uso (accessed 14 June 2022).
- Jouanjean, M.-A., Casalini, F., Wiseman, L. and Gray, E. 2020, *Issues around data governance in the digital transformation of agriculture: The farmers' perspective*, 23 October, OECD Food, Agriculture and Fisheries Papers, OECD Publishing, Paris.
- Karen, S. 2021, 'Govt urged to pass infrastructure cyber security intervention powers', *ARNnet*.
- Kox, H. and Straathof, B. 2014, *Economic aspects of Internet security*, CPB Background Document, Central Planning Bureau, Netherlands.
- Kwan, C. 2021, 'Critical Infrastructure Bill should be split to swiftly give government step-in powers: PJCIS', *ZDNet*.
- 2022, *Planning for telecommunications CDR rules and open finance are underway*, <https://www.zdnet.com/article/telecommunications-sector-officially-designated-for-cdr-and-open-finance-is-underway/> (accessed 30 May 2022).
- Lambert, T. 2021, 'What's behind the war on big tech?', *Regulation*, vol. Fall 2021, pp. 30–36.
- Lim, C., Bowe, K., Gunning, P. and Denham, C. 2022, *Parliament Considers Ransomware Plan Legislation*, <https://www.kwm.com/au/en/insights/latest-thinking/parliament-considers-ransomware-plan-details.html> (accessed 25 May 2022).
- Lipsey, R.G., Carlaw, K.I. and Bekar, C.T. 2005, *Economic transformations: general purpose technologies and long-term economic growth*, Oxford University Press, Oxford.
- Manyika, J., Silberg, J. and Presten, B. 2019, 'What Do We Do About the Biases in AI?', *Harvard Business Review*.
- MCA (Minerals Council of Australia) 2022, *The Digital Mine: A review of Australia's mining innovation ecosystem*, September, https://www.minerals.org.au/sites/default/files/The%20Digital%20Mine_2022.pdf (accessed 10 January 2023).
- McKinsey 2019, *Catch them if you can: How leaders in data and analytics have pulled ahead*, 19 September.
- Medibank 2022, *Calvary-Medibank using AI and remote monitoring to support more than 130,000 COVID patients so far*, <https://www.medibank.com.au/livebetter/newsroom/post/calvary-medibank-using-ai-and-remote-monitoring-to-support-more-than-130-000> (accessed 9 August 2022).

- Microsoft 2019, *Microsoft and General Assembly launch partnership to close the global AI skills gap*, <https://news.microsoft.com/2019/05/17/microsoft-and-general-assembly-launch-partnership-to-close-the-global-ai-skills-gap/> (accessed 27 July 2022).
- 2022, *Browse Certifications and Exams*, <https://docs.microsoft.com/en-us/learn/certifications/browse/> (accessed 17 May 2022).
- Min, H. 2000, 'Electronic data interchange in supply chain management', in Swamidass, P. (ed), *Encyclopedia of Production and Manufacturing Management*, Springer, Boston, MA.
- MoJ (Ministry of Justice) 2018, *Accessing the Justice Data Lab service*, <https://www.gov.uk/government/publications/justice-data-lab> (accessed 16 May 2022).
- Moll, J. and Cajander, Å. 2020, 'Oncology health-care professionals' perceived effects of patient accessible electronic health records 6 years after launch: a survey study at a major university hospital in Sweden', SAGE Publications Sage UK: London, England, *Health informatics journal*, vol. 26, no. 2, pp. 1392–1403.
- Moore, T. 2010, 'The economics of cybersecurity: Principles and policy options', Elsevier, *International Journal of Critical Infrastructure Protection*, vol. 3, no. 3–4, pp. 103–117.
- Müller, V. 2020, *Ethics of Artificial Intelligence and Robotics*, 30 April, Stanford Encyclopedia of Philosophy.
- MYOB 2022, *The Digital Disconnection Challenge*, June, https://www.myob.com/content/dam/public-website/docs/misc/The%20Digital%20Disconnection%20Challenge_MYOB%20Report%202022.pdf (accessed 22 November 2022).
- National Cabinet 2021, *Intergovernmental Agreement on data sharing between Commonwealth and State and Territory governments*, July.
- NBN 2020, *Initial build complete, NBN Co announces next phase of network investment to meet future demand*, <https://www.nbnco.com.au/content/dam/nbnco2/2020/documents/media-centre/corporate-plan-2021/nbnco-media-release-corporate-plan-2021.pdf> (accessed 12 May 2022).
- 2022, *The technology that connects your premises*, <https://www.nbnco.com.au/learn/network-technology> (accessed 5 May 2022).
- NCVER (National Centre for Vocational Education Research) 2021, *Employers' Use and Views of the VET System 2021*.
- 2022, *VOCSTATS*, <https://www.ncver.edu.au/research-and-statistics/vocstats> (accessed 17 May 2022).
- NDIA (National Disability Insurance Agency) 2020, *Delivering the NDIS: Digital Partnership Program begins developer onboarding phase*, <https://www.ndis.gov.au/news/4887-delivering-ndis-digital-partnership-program-begins-developer-onboarding-phase> (accessed 14 June 2022).
- NIST (National Institute of Standards and Technology) 2022, *Software Supply Chain Security Guidance Under Executive Order (EO) 14028 Section 4e*, 4 February.
- NSC (National Skills Commission) 2021a, *Skills Priority List*, <https://www.nationalskillscommission.gov.au/topics/skills-priority-list> (accessed 31 May 2022).
- 2021b, *Skills Priority List Findings: ICT Professionals*, National Skills Commission, Canberra.
- 2022, *Australian Skills Classification 2.0 data*, <https://www.nationalskillscommission.gov.au/sites/default/files/2022-03/Australian%20Skills%20Classification%20-%20March%202022.xlsx> (accessed 31 May 2022).
- nd, *Australian Skills Classification*, <https://www.nationalskillscommission.gov.au/topics/australian-skills-classification> (accessed 18 May 2022).
- NSW Government 2021, *NSW Identity Strategy*, April, <https://www.nsw.gov.au/sites/default/files/2021-05/NSW-Government-Identity-Strategy-accessible.pdf> (accessed 24 November 2022).
- NSW Health 2021, *Lumos: Shining a light on the patient journey in NSW*, <https://www.health.nsw.gov.au/lumos> (accessed 16 May 2022).
- NSW PC (NSW Productivity Commission) 2022, *Adaptive NSW: how embracing tech could recharge our prosperity*, November, https://www.productivity.nsw.gov.au/sites/default/files/2022-11/20221117-nsw-productivity-commission_adaptive-nsw_how-embracing-tech-could-recharge-our-prosperity.pdf (accessed 28 November 2022).
- OAIC (Office of the Australian Information Commissioner) 2017, *Australian Community Attitudes to Privacy Survey 2017*, Home, <https://www.oaic.gov.au/updates/videos/australian-community-attitudes-to-privacy-survey-2017> (accessed 16 December 2022).
- 2021, *Data breach report highlights ransomware and impersonation fraud as concerns*, 23 August.
- nd, *About the Notifiable Data Breaches scheme*, <https://www.oaic.gov.au/privacy/notifiable-data-breaches/about-the-notifiable-data-breaches-scheme> (accessed 1 June 2022).
- ODI (Open Data Institute) 2020, *The value of sharing data in supply chain optimisation*, 3 March.
- OECD (Organisation for Economic Co-operation and Development) 2015, *Data-Driven Innovation: Big Data for Growth and Well-Being*, OECD Publishing, Paris.
- 2019, *Enhancing Access to and Sharing of Data: Reconciling Risks and Benefits for Data Re-use across Societies*, 26 November, OECD Publishing, Paris.
- 2020, *Shaping the Future of Regulators: The Impact of Emerging Technologies on Economic Regulators, The Governance of Regulators*, OECD Publishing, Paris.
- 2021, *SMEs Going Digital: Policy challenges and recommendations*, Going Digital Toolkit Policy Note, 15.
- 2022a, *Broadband Portal*, <https://www.oecd.org/digital/broadband/broadband-statistics/> (accessed 20 May 2021).
- 2022b, *ICT Access and Usage by Businesses*, https://stats.oecd.org/Index.aspx?DataSetCode=ICT_BUS (accessed 20 May 2022).
- Ofcom (Office of Communications) 2022, *International Broadband Scorecard 2020: interactive data*, London, UK.
- ONDC (Office of the National Data Commissioner) 2022, *Data Availability and Transparency Act 2022*, <https://www.datacommissioner.gov.au/data-legislation/data-availability-and-transparency-act> (accessed 13 May 2022).
- Ookla Speedtest 2022, *Speedtest Global Index*, <https://www.speedtest.net/global-index> (accessed 2 February 2022).
- OPCC (Office of the Privacy Commissioner of Canada) 2020, *A Regulatory Framework for AI: Recommendations for PIPEDA Reform*, November.
- OPCNZ and CDS (Office of the Privacy Commissioner (New Zealand) and Chief Data Steward) 2018, *Principles for safe and effective use of data and analytics*,

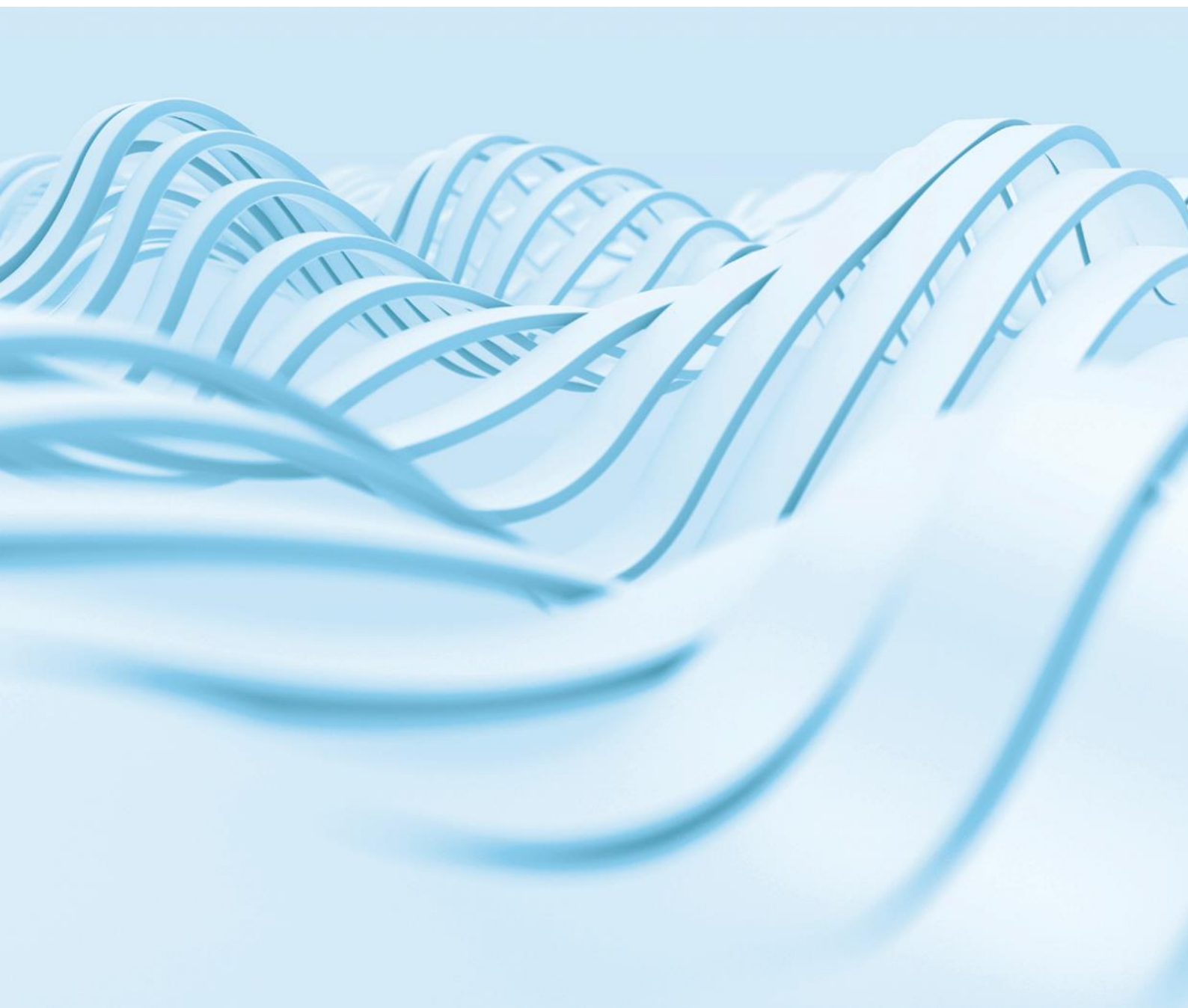
- <https://www.privacy.org.nz/publications/guidance-resources/principles-for-the-safe-and-effective-use-of-data-and-analytics-guidance/> (accessed 1 June 2022).
- Open Knowledge Foundation 2017, *Global Open Data Index: Australia*, <https://index.okfn.org/place/au/> (accessed 13 May 2022).
- Optus 2016, *Submission in Response to Productivity Commission Issues Paper: Telecommunications Universal Service Obligation*, July.
- Pagone, T. and Briggs, L. 2021, *Aged Care Royal Commission Final Report: Recommendations*.
- Parliament of Australia 2022, *Crimes Legislation Amendment (Ransomware Action Plan) Bill 2022*.
- Parliament of Victoria 2021, *Health Legislation Amendment (Information Sharing) Bill 2021*, 4 October.
- PC (Australian Government Competitive Neutrality Complaints Office) 2022, *NBN Co*, Investigation No. 18, Canberra.
- 2014, *Public Infrastructure*, Report no. 71, Canberra.
- 2015, *Public Safety Mobile Broadband*, Research Report, Canberra.
- 2016, *Intellectual Property Arrangements*, Report no. 78, Canberra.
- 2017a, *Data Availability and Use*, Report no. 82, Canberra.
- 2017b, *Telecommunications Universal Service Obligation*, Report no. 83, Canberra.
- 2018, *Superannuation: Assessing Efficiency and Competitiveness*, Report no. 91, Canberra.
- 2021a, *Australia's prison dilemma*, Research Paper, Canberra.
- 2021b, *Innovations in Care for Chronic Health Conditions*, Productivity Reform Case Study, Canberra.
- 2021c, *Working from home*, Commission Research Paper, Canberra.
- Penn, A. 2021, *We're investing hundreds of millions to extend and enhance our regional, rural and remote coverage*, 6 May, Telstra.
- Pérez, L., Rodríguez-Jiménez, S., Rodríguez, N., Usamentiaga, R. and García, D.F. 2020, 'Digital twin and virtual reality based methodology for multi-robot manufacturing cell commissioning', *Applied sciences*, vol. 10, no. 10, p. 3633.
- Petersson, L., Erlingsdóttir, G., and others 2018, 'Open notes in Swedish psychiatric care (part 2): survey among psychiatric care professionals', *JMIR mental health*, vol. 5, no. 2, p. e10521.
- PMC (Department of Prime Minister and Cabinet) 2021a, *Australian Data Strategy Action Plan*, Commonwealth of Australia, Canberra.
- 2021b, *Australian Data Strategy: The Australian Government's whole-of-economy vision for data*, Commonwealth of Australia, Canberra.
- 2021c, *Digital Economy Strategy 2030*, Commonwealth of Australia, Canberra.
- 2022a, *\$20 million investment in software to save businesses time and money*, <https://ministers.pmc.gov.au/morton/2022/20-million-investment-software-save-businesses-time-and-money> (accessed 16 May 2022).
- 2022b, *Digital Economy Strategy 2022 Update*, Commonwealth of Australia, Canberra, p. 88.
- 2022c, *Positioning Australia as a leader in digital economy regulation - Automated Decision Making and AI Regulation*, Commonwealth of Australia, Canberra.
- Presidente, G. and Frey, C.B. 2022, *The GDPR effect: How data privacy regulation shaped firm performance globally*, CEPR, <https://cepr.org/voxeu/columns/gdpr-effect-how-data-privacy-regulation-shaped-firm-performance-globally> (accessed 16 December 2022).
- PwC (PricewaterhouseCoopers) 2017, *Cyber Security: Director responsibilities in a changing legislative environment*, <https://www.pwc.com.au/about-us/insights/non-executive-directors/cyber-security-director-responsibilities-in-a-changing-legislative-environment.html> (accessed 25 May 2022).
- Qu, J., Simes, R. and O'Mahony, J. 2017, 'How do digital technologies drive economic growth?', *Economic Record*, vol. 93, pp. 57–69.
- Queensland Health 2016, *Specialist Outpatient Strategy: Improving the patient journey by 2020*, May, State of Queensland, Brisbane.
- RACGP (Royal Australian College of General Practitioners) 2022, *General Practice Crisis Summit: White paper*, November, RACGP, East Melbourne, Vic.
- RAI (Regional Australia Institute) 2016, *The Economic Contribution of Regions to Australia's Prosperity*, Regional Australia Institute, Canberra.
- RDV (Regional Development Victoria) 2021, *Regional Digital Fund*, <https://www.rdv.vic.gov.au/grants-and-programs/regional-digital-fund> (accessed 8 June 2022).
- Reset Australia 2021, *Did we really consent to this? Terms & Conditions and young people's data*, July.
- Rinta-Kahila, T., Gillespie, N., Asadi Someh, I. and Indulska, M. 2021, *How to avoid algorithmic decision-making mistakes: lessons from the Robodebt debacle*, <https://stories.uq.edu.au/momentum-magazine/robodebt-algorithmic-decision-making-mistakes/index.html> (accessed 6 July 2022).
- RMIT Online and Deloitte Access Economics 2021, *Ready, Set, Upskill: Effective Training for the Jobs of Tomorrow*.
- RMIT (Royal Melbourne Institute of Technology) 2022, *Courses & degrees*, <https://online.rmit.edu.au/courses?category=short> (accessed 17 May 2022).
- Robert, S. 2021, *Public consultation opened on Australia's Digital Identity Legislation*, Ministers' Media Centre, <https://ministers.dese.gov.au/robert/public-consultation-opened-australias-digital-identity-legislation> (accessed 24 November 2022).
- and Hume, J. 2021, *6 million Australians using Digital Identity to access online services*, Ministers' Media Centre, <https://ministers.dese.gov.au/robert/6-million-australians-using-digital-identity-access-online-services> (accessed 24 November 2022).
- RTIR Committee (Regional Telecommunications Independent Review Committee) 2021, *2021 Regional Telecommunications Review: A step change in demand*, Australian Government.
- Sadler, D. 2022, 'Reworked data-sharing legislation returns to Parliament with Labor's support', *InnovationAus*.
- Scottish Government 2018, *Safe, secure and prosperous: A cyber resilience strategy for Scotland — Private sector action plan 2018-20*, June, Scottish Government, Edinburgh.
- Shah, R. 2020, *Working smarter, not harder*, Australian Strategic Policy Institute.

- 2022, *The future of digital identity in Australia*, APSI: The Strategist, <https://www.aspistrategist.org.au/the-future-of-digital-identity-in-australia/> (accessed 24 November 2022).
- Shergold, P., Broadbent, J., Marshall, I. and Varghese, P. 2022, *Fault lines: An independent review into Australia's response to COVID-19*, 20 October, <https://independentcovidreview.com/wp-content/uploads/2022/10/FAULT-LINES-1.pdf> (accessed 2 December 2022).
- Sier, J. 2022, 'Logan uses government data to transform kindergarten', *Australian Financial Review*, 3 July.
- Smedes, M., Nguyen, T. and Tenburren, B. 2022, 'Valuing data as an asset, implications for economic measurement', presented at Economic Implications of the Digital Economy Conference, Sydney, NSW, Australian Bureau of Statistics, March.
- Smith, P. 2022, 'Directors and industry at risk from "knee-jerk" tech policies', *Australian Financial Review*, 14 March.
- Smith, Z.M., Lostri, E. and Lewis, J. 2020, *The Hidden Costs of Cybercrime*, 9 December, Center for Strategic and International Studies (CSIS) & McAfee, San Jose, CA.
- Statistics Canada 2019, *The value of data in Canada: Experimental estimates*, <https://www150.statcan.gc.ca/n1/pub/13-605-x/2019001/article/00009-eng.htm> (accessed 2 June 2022).
- TCA (Technology Council of Australia) 2021a, *Australia has a rich resource in its people. Further cultivating a bright, engaged workforce will deepen opportunities for Australia to be a leading digital economy.*, <https://techcouncil.com.au/policy/priorities/talent/> (accessed 18 May 2022).
- 2021b, *Roadmap to Deliver One Million Tech Jobs*, October.
- 2022, *Australia's Tech Jobs Opportunity – Cracking the Code to Australia's Best Jobs*, March.
- TechnologyOne 2019, *SaaS vs On-premise*.
- TGA (Therapeutic Goods Administration) 2017, *International agreements and arrangements for GMP clearance*, <https://www.tga.gov.au/international-agreements-and-arrangements-gmp-clearance> (accessed 27 June 2022).
- The White House 2021, *Executive Order on Improving the Nation's Cybersecurity*, 12 May.
- Thomas, J., Barraket, J., Parkinson, S., Wilson, C., Holcombe-James, I., Brydon, A. and Kennedy, J. 2021, *Australian Digital Inclusion Index: 2021*, RMIT and Swinburne University of Technology, and Telstra, Melbourne.
- Tonkin, C. 2021, *Robodebt was an AI ethics disaster*, <https://ia.acs.org.au/article/2021/robodebt-was-an-ai-ethics-disaster.html> (accessed 6 July 2022).
- Treasury 2021a, *Consumer Data Right in the energy sector: Proposals for further consultation August 2021*, August.
- 2021b, *Government Response to the Inquiry into Future Directions for the Consumer Data Right*, December.
- 2022a, *Consumer Data Right - Exposure draft legislation to enable action initiation*, <https://treasury.gov.au/consultation/c2022-317468> (accessed 16 December 2022).
- 2022b, *Consumer Data Right Strategic Assessment: Outcomes*, January.
- 2022c, *Statutory Review of the Consumer Data Right*, Australian Government, Canberra.
- UC (University of California Presidential Working Group on AI) 2021, *Responsible Artificial Intelligence*, October.
- UN DESA (United Nations Department of Economic and Social Affairs) 2020, *E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development*, United Nations, New York.
- UNESCO (United Nations Educational, Scientific and Cultural Organization) 2021, *UIS.Stat - Education - Other policy relevant indicators - Distribution of tertiary graduates by field of study*, <http://data.uis.unesco.org/> (accessed 31 May 2022).
- United States' Congress 2019, *H.R.2231 - Algorithmic Accountability Act of 2019*.
- VHA (Vodafone Hutchison Australia) 2016, *Telecommunications Universal Service Obligation Issues Paper*, July.
- Vopson, M.M. 2020, 'The information catastrophe', *AIP Advances*, vol. 10, no. 8, p. 085014.
- Vu, K. 2013, 'Information and Communication Technology (ICT) and Singapore's Economic Growth', *Information Economics and Policy*, vol. 25, pp. 284–300.
- Weaver, J. and O'Connor, S. 2022, *Tending the Tech-Ecosystem: Who should be the tech-regulator(s)?*, ANU Tech Policy Design Centre, Canberra, ACT.
- WEF (World Economic Forum) 2020a, *A Roadmap for Cross-Border Data Flows: Future-Proofing Readiness and Cooperation in the New Data Economy*, June.
- 2020b, *The Future of Jobs Report 2020*, October.
- 2022, *Global Cybersecurity Outlook 2022*, January.
- Westendorf, T. 2022, *Artificial intelligence and policing in Australia*, April, Australian Strategic Policy Institute.
- Williams, S. 2022, 'Greater balance needed in AU Critical Infrastructure Bill', *IT Brief*.
- World Bank 2021a, *Global Data Regulation Diagnostic Survey Dataset 2021*, <https://microdata.worldbank.org/index.php/catalog/3866> (accessed 13 May 2022).
- 2021b, *World Development Report 2021: Data for better lives*, World Bank, Washington, DC.
- Xero 2021a, *One step: Behavioural barriers to technology adoption amongst small businesses – and how to overcome them*, November.
- 2021b, *Xero ecosystem survey: Summary of findings*, September.
- Zhang, D., Mishra, S., Brynjolfsson, E., Etchemendy, J., Ganguli, D., Grosz, B., Lyons, T., Manyika, J., Niebles, J.C., Sellitto, M., and others 2021, *The AI Index 2021 Annual Report*, March, AI Index Steering Committee, Human-Centered AI Institute, Stanford University, Stanford, CA.



5-year Productivity Inquiry: Innovation for the 98%

Inquiry report – *volume 5*



The Productivity Commission acknowledges the Traditional Owners of Country throughout Australia and their continuing connection to land, waters and community. We pay our respects to their Cultures, Country and Elders past and present.

The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

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ISSN 1447-1337 (online)

ISSN 1447-1329 (print)

ISBN 978-1-74037-759-1 (set)

ISBN 978-1-74037-764-5 (volume 5)

An appropriate reference for this publication is:

Productivity Commission 2023, *5-year Productivity Inquiry: Innovation for the 98%*, Vol. 5, Inquiry Report no. 100, Canberra

Publication enquiries:

Media, Publications and Web | phone 03 9653 2244 | email publications@pc.gov.au

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The Commission's report is divided into 9 volumes: an overview document (volume 1) that presents our policy agenda, and inquiry content volumes (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda, including a modelling appendix. The full report is available from www.pc.gov.au.

Preface

Between 1 and 2% of Australian businesses innovate in ways that are new to the world. Such leading innovations can promote productivity, but there are already many policies in place to promote them. What of the neglected 98% for which the potential for, and desirability of, new-to-the-world innovation is weaker? **Much productivity improvement involves the wider adoption of established, even dated, technologies and practices** among those millions of businesses.

There is a large group of Australian businesses whose management practices, uptake of technology and productivity are below their best practice peers. For example, many businesses undertake little or no assessment of their performance, though this is a major motivator and route to improvement. It is not possible for all businesses to achieve best practice because of large variations in managers' and employees' aptitudes and preferences, and the operating environments of firms. However, by incrementally improving the performance of those businesses, higher rates of diffusion of best practice could significantly lift aggregate productivity growth.

There are worrying signs that **some of the principal vehicles for acquiring and transferring knowledge are dormant or slowing**. Machinery and equipment investment, which typically embeds new knowledge and best practice, has collapsed as a share of GDP. Investments in intangible capital, like software and R&D, have been stagnating. As workers move between businesses, they bring their experience with different technologies and practices with them, sharing them with their new employer; yet, labour mobility between businesses has been declining. So too has the degree of churn in markets as measured by the generally falling rates of firm entry and exits. This is concerning because business exits and entries underpin an entrepreneurial culture and uptake of innovations, and shift resources into activities more likely to generate value and productivity. The one positive sign is that the average level of skills in the workforce has been gradually rising, which generally improves diffusion.

The solutions to these problems are different from the incentives, grants, venture capital funds and public research institutes typically used to stimulate novel innovation. The most important are the settings that determine the quality of the business environment because these determine the incentives, resources and capabilities of firms to invest in and adopt established innovations. Those policies encompass tax policy, the thousands of statutes and regulations that shape business options across almost all facets of the economy, trade and competition policy, skill formation settings, immigration and foreign investment policy. Policies that drive economic efficiency more broadly are the focus of Productivity Inquiry companion volumes on the business environment.

Some aspects of the business environment are particularly relevant for enabling diffusion in the business sector.

As a small open economy with limited (business and public) research capacity, **many ideas and technologies will come to Australia from overseas**. Linkages with overseas firms via trading relationships are important, as is foreign direct investment (FDI). Foreign investors have an incentive to channel knowledge, technologies and expertise to Australian firms, as well as financial capital, to improve the prospects for a return on their investment. More recognition of overseas standards, more streamlining of foreign investment approvals and the elimination of nuisance tariffs would more rapidly diffuse overseas innovations.

Skilled migration policy should be reframed as a way of diffusing innovation and best practice among Australian businesses. Businesses can be conceived as experimental laboratories in delivering goods and services to consumers, so it makes sense to understand the lessons from as wide a variety of experiments as

possible. Skilled migrant workers transmit knowledge and the know-how to practically implement it from all over the world. An expanded and adapted employer-nominated migration scheme would allow better matching of the skills and knowledge needed by employers and the unique capabilities held by migrants.

Information flows, including those arising from other businesses' experiences with new technologies and practices can be mediated by industry associations, consultants and experts (including academics). In Australia, industry associations play a critical role in realising spillovers by drawing together insights from their members' experiences with innovation and helping firms to apply them to their own circumstances. The chief problem is not that associations are deficient in this role, but that the potential recipient businesses often do not know how far away they are from best practice. In their role as data collectors, the Australian Tax Office (ATO), the Australian Bureau of Statistics (ABS), and various regulators have rich data that, in a curated form and with business consent, they could return to businesses to tell them where they lie on the spectrum of performance with their peers. No business wants to be last in the entrepreneurial race.

Innovation and best practice are equally important for the public sector. Australian governments are the major funders (and providers) of a large part of the economy, including educational services, the justice and defence systems, health, disability and aged care, and design and implement the tax and transfer system. General government spending amounts to nearly \$900 billion or over 40% of GDP, with much of this — some \$445 billion — spent on delivery of services to the Australian community. Against this scale and breadth of activities, even modest improvements in innovation and the diffusion of best practice will improve the quality of outcomes for citizens and in some cases, reduce fiscal pressures. (It can also have knock-on effects as best practice policy improves the business environment.)

There are many examples of effective innovation and diffusion in government. For example, the response to COVID-19 led to rapid expansions in e-health and new models of schooling.

However, innovation and the uptake of best practice is often sluggish, patchy and inconsistent across jurisdictions. For instance, while it has limitations, activity-based pricing for public hospitals was a big step forward for improved efficiency in the healthcare system, but it took 17 years before it was adopted by all jurisdictions. Benchmarking of governments' performance across multiple dimensions — school education, elective surgery waiting times, prisoner education, support services for people experiencing homelessness — suggest many have failed to mimic the practices of the best. (While the public know that there are big differences in performance, they know less about why and what could be done. Governments could readily undertake more analysis to uncover what lies beneath.)

Slow progress reflects that governments face unique challenges in innovation and the adoption of best practice. Sometimes that is reasonable. Ethics sometimes demands some slowness because people's lifetime wellbeing may be involved, for example, a new mandated way of educating Australia's 4 million school students. Governments have contested, ambiguous and vague objectives such that success is hard to measure, and they often (reasonably) decide to prioritise different social and economic goals. Businesses ultimately measure their success through profits.

But slowness also reflects structural defects. Uncoordinated actions of governments and agencies that share overlapping roles, siloed services, clashing funding incentives and risk-averse cultural norms tend to work against experimentation. Few publicly-operated services fear that poor performance will lead to their closure.

One solution is to **re-configure some of the poorly designed ways of commissioning and funding activities**. In public infrastructure and defence procurement, billions are spent on deficient, slow or over-budget projects because procurement models are far from best practice. In healthcare, the Australian Government funds primary care mainly through the small business sector (GPs), while the States and Territories are the primary funders of the most costly and sophisticated part of the system — large

government-run public hospitals. It makes sense to keep people out of hospital where possible, but hospitals have no incentives to prevent hospitalisation (and are in any case restricted in what they are allowed to do in primary health). There are novel funding models that could reduce these perverse incentives.

Government agencies create barriers to recruiting people from overseas that are much greater than those for private sector occupations despite immigrants being some of the best conduits for fresh ideas in policy. Citizenship and security requirements are arguably too restrictive and could be relaxed.

Ideas have a peculiarity that one person's use of them does not stop someone else from using them. **Where there is a sound public good basis, use of ideas should be free as this encourages diffusion and innovation.** Many Australian standards — which are an explicit way of codifying practices that should be widely diffused — are priced. That, and the charging arrangements for the academic literature arising from publicly-funded research, should be reformed.

There are significant productivity rewards on the table from improvements in diffusion, even modest ones. This volume of the 5 Year Productivity Inquiry presents the Commission's findings and recommendations for government to support increased innovation and diffusion to improve productivity across the Australian economy.

1. The case for strengthening the diffusion of innovation

Key points

- * While novel, 'new-to-the-world', innovation is an important source of economic performance, it relates to only 1 to 2% of Australian firms. The slow accumulation of existing knowledge across the economy — diffusion — is often overlooked as a source of productivity. It has the scope to lift the performance of millions of businesses.
- * Diffusion of knowledge in the non-market service sector, which governments control, fund and often run, can lift the quality of services central to Australians' wellbeing (such as education and healthcare). Diffusion of best practice regulation can also raise the efficiency of the private sector.
- * Australian businesses are not keeping up to the frontier of innovation, even in comparison to similar businesses in other countries. Yet they may not be aware of how far they lag behind. Many Australian businesses undertake little or no assessment of their performance, and overall management capability — a critical determinant of adoption of best practice — appears to be weak for a large share of businesses, and significantly worse on average compared with the United States.
- * There are signs that the 'diffusion machine' has weakened, with slower growth of most of the key factors driving diffusion — labour mobility, business exits and entries, and overall investment in capital that embeds new ideas ('capital with brains') — such as equipment and machinery, R&D and software.
- * The key policy levers for diffusion are different from those relevant to novel innovation. The quality of the business environment that affects knowledge flows and adoption — regulatory settings, skill formation, immigration and foreign direct investment policy, and competition policy — is far more critical than piecemeal interventions.

1.1 A focus on diffusion

Advances in knowledge and technology have been the main driver of economic growth and transformation throughout history (Williamson et al. 2015). Brawn aside, workers' contribution to output reflects what is ultimately inside their heads, regardless of how it ends up there. Intangible capital — such as intellectual property, training, software, and organisational methods — are major conduits for that knowledge. But so is physical capital — all machines are the physical embodiment of knowledge. So, creating policy environments conducive to the creation of new ways of doing things ('innovation'), and diffusing and maintaining these, is the key to being an innovative economy.

In Australia, innovation policy has tended to give pre-eminence to interventions that foster the creation of novel productivity-enhancing ideas and technologies in selective parts of the business sector, including by leveraging the frontier research expertise in universities. Policies oriented towards novel innovation can be important for productivity growth,¹ though are often inadequately tested for their appropriateness, effectiveness and overall benefits.

One consequence is that innovation policies of seemingly general application turn out to have limited direct relevance to large parts of the modern economy. As documented for the United States, and with equal application to Australia, different parts of the economy innovate in different ways (Andrews, Chatterji and Stern 2022). The manufacturing, ICT and some business service industries make considerable use of formal R&D.² Much of the services sector does not. Patents are prominent in manufacturing and IT development industries, but of much lesser relevance in other parts of the economy (PC 2016a, p. 267). Hence policies based on the commercialisation of patentable IP will tend to be narrow in their coverage. Where innovation policy focuses mainly on cutting-edge scientific or technological breakthroughs, it tends to miss the way firms in much of the economy are innovating on the ground.

As noted in this inquiry's companion volume, *Keys to growth*, the Australian economy is increasingly dominated by the services sector. Key questions for innovation policy are: what does innovation look like across the broad sweep of the services sector? How do service firms innovate? How do they identify and implement changes to their service offering?

A narrative that concentrates on new-to-the-world innovation misses a significant piece of the productivity-innovation story — the huge power of small changes across many firms. Fostering the adoption and use — that is, the diffusion — of new and established technologies and ideas across the majority of enterprises in the economy represents a significant opportunity to increase productivity (box 1.1). This applies across all industries, but with particular relevance for services, such as in retailing, hospitality, transport and low-scale construction.

Diffusion will often involve the incremental adoption of already widely available, even dated innovations — for example, using accounting software to manage financials (rather than a 'shoebox of cluttered accounts') or creating a web page to improve the customer visibility of a business. But diffusion can also involve the absorption and adaptation of existing cutting-edge technologies, such as artificial intelligence applications to business processes. In this respect, diffusion and innovation are related concepts. A firm that adopts and possibly adapts an existing idea is a beneficiary of diffusion, but at the firm or industry level is still an innovator. Moreover, an innovative mindset and capability within firms often aids the absorption of new ideas from elsewhere. And an economy with strong diffusion channels implies a market for new ideas, hence greater incentives for new pathbreaking innovation. But a focus on diffusion is a good guide for innovation policy. In many respects, it is the main game.

¹ There is a vast literature on the impacts of novel innovation on firm performance and productivity. Significant work in this regard includes Hall (2011); Hall & Mohnen (2013); Crepon et al. (1998); Janz et al. (2004); and Lööf & Heshmati (2006).

² In 2020-21, three fields of research dominated Australian business R&D — information technology, engineering, and biomedical and clinical science — accounting for more than 80% of the total spending (ABS 2021c table 7). The industries in which these fields were most concentrated were manufacturing, and professional, scientific and technical services, which in turn were the recipients of about 80% of all Australian governments' funding of business R&D (ABS 2021c table 4).

Box 1.1 – What we mean by innovation and diffusion

The standard definition of innovation is that it is the process whereby businesses, governments and other organisations and individuals generate or maintain value by creating, adapting or using available knowledge and technology to introduce new or improved products (goods and/or services) or internal business processes.^a Importantly, this definition includes innovation that is new to the world, to Australia or an industry, or even just new to the firm that is adopting and implementing the idea, production technique or technology.

Such innovation goes beyond physical goods with wide recognition that it also encompasses new ways to organise business processes and functions, and new marketing methods. Indeed, many important innovations have been of the organisational kind — for example, new ways to organise production and distribution — as opposed to new products (goods and/or services) or production techniques (Fagerberg 2018, p. 7; Thomson and Webster 2013). Franchising, just in time inventory management, and web-based sales are exemplars, now widely adopted globally and in Australia. The shift to working from home that occurred with the COVID-19 pandemic represents one of the more recent shifts in how work is organised. While the productivity impacts of that shift are not yet clear, the Productivity Commission has speculated that working from home may ultimately lead to productivity gains at the economy-wide level (PC 2021f, p. 3), and they have certainly saved commuting times for millions of people.

Innovation at the frontier of knowledge represents only a small share of innovation activity and innovating firms in Australia (and in most countries, see OECD 2020). Innovation *diffusion* — the process by which knowledge and technologies are communicated, adopted and adapted over time in an economy — is how the vast majority of firms achieve productivity growth. Without diffusion, new technologies and knowledge would have less impact on productivity growth — innovation requires businesses and other actors to *implement* or *apply* new ideas and technology that generate real returns (Hall 2004).

Modest incremental low-cost changes to a business' processes, goods and services ('micro innovations') that underpin much diffusion shift firms closer to the frontier, and can creep up on organisations because they are adopted in response to the demands of others. Cash-free transactions, for example, became essential for many organisations during the COVID-19 pandemic, as did online ordering and video-conferencing. The Restaurant and Catering Association told the Productivity Commission that most cafes and restaurants now use Uber Eats/Deliveroo (R&CA, pers. comm., 9 June 2022) — a massive uptake of technology compared with their previous models of delivery. Most regulators have relinquished paper forms (their own micro innovation), which in turn has required the regulated to go online. New equipment incorporates new technologies that require workers to learn new skills and firms to make organisational changes to use the equipment effectively. For example, new heavy vehicles have additional safety measures that their drivers and owners must understand and use, while mechanics for such equipment must acquire new skills (and diagnostic equipment).

a. Consistent with OECD/Eurostat (2018). Process innovations include new or improved methods for producing goods and services; organisational forms; marketing methods.

Some proponents of new-to-the-world innovation policy have concerns about a focus on diffusion. In their view, Australia will lag behind unless it develops successful new-to-the-world exports in growth industries. However, policies that help diffusion are not at the expense of businesses' attempts to create flagship new-to-the-world products, and there are already many policies aimed in the latter's direction. And prosperity is not reliant on the growth in exports of such flagship products. Even if resource prices fall in the future, Australia — as a country with a highly skilled workforce and other endowments — will continue to enjoy a comparative advantage in and export a range of goods and services (including tourism, education and some professional and technology services), as it imports goods and services that are produced better or more cheaply overseas.

Productivity gains in all of these sectors will be important and will be supported by more diffusion. Stylised whole-of-economy modelling undertaken by the Commission for this inquiry found that potential productivity improvements arising from more diffusion of new ideas, knowledge, business models, technologies and capabilities would lead to increased real GDP, gross national income and individual wellbeing (appendix A).

For many organisations, diffusion involves lower risks, shorter lead times, less external funding and fewer demands for a specialised workforce — making it attractive for the bulk of organisations. The strategy of seeking out, adapting and implementing existing innovations appears to have been a successful strategy for many Australian firms (DIIS 2017). Indeed, the productivity slowdown may reflect a slowing of diffusion processes rather than less fundamental innovation (as discussed further below).

Moreover, as a small, open economy with, by global standards, limited resources and R&D capacity, many ideas and technologies will come from outside Australia, underlining the importance of a global perspective on diffusion. For example, the challenges posed by climate adaptation and mitigation will require the adoption and adaption of existing technologies as much as the development of entirely new ones.

Diffusion pushes more firms to the frontier

Diffusion increases the productivity of those organisations that adopt and adapt existing, but new-to-the-business technologies and processes. This changes the relative proportions of low versus medium versus high performing organisations in the economy, raising national productivity. Among any group of organisations (comprising businesses, not-for-profit organisations and public sector agencies) there are some that are at the frontier of performance. These make the best use of their resources, are dynamic and future-focused, and are quick adopters of others' technologies. They may develop new-to-the-world innovations, though that need not be a key feature of their operations. The more organisations in an economy that are like this, the more productive is society overall, and the more rapidly it can absorb global technologies.

The bulk of organisations are behind the frontier, but by varying degrees — some close, some distant. Closing the gap between their performance and that of the best would increase average economy-wide productivity. That can occur through four mechanisms:³

- exit by those entities that have few prospects of improving (and therefore 'natural selection' of the fittest)
- entry by entities that are generally more efficient
- growth in the capabilities of the viable but lagging surviving entities
- through competitive pressures, increases in the market share of the most productive entities.

These mechanisms increase the average proximity of organisations to the frontier. One of the unique features of organisations run by the public sector, like schools, is that exits are rare and competition for the market is not very important, and so diffusion can only occur through the other mechanisms.

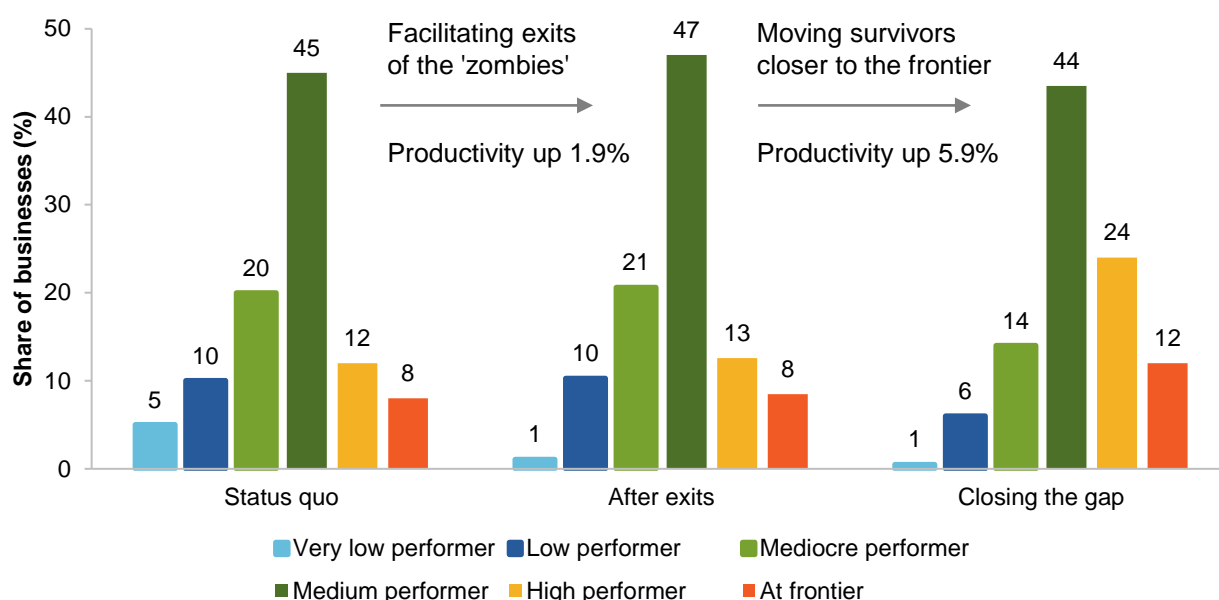
³ These are 'average' effects. Businesses constantly face upward and downward shifts in productivity — for example, demand shocks affect capital utilisation, there are supply disruptions, and key staff come and go.

Figure 1.1 is a hypothetical depiction of the process, underpinned by some quantitative assumptions, which illustrates the effects of the above mechanisms. It illustrates that the reallocation of resources — from failing firms to new firms that are more efficient — can be an important driver of economy-wide productivity. The likely bigger effect arises when the surviving firms adopt better ways of producing their outputs and when the market share of the most productive firms rises. More output is produced by firms approaching the frontier.

Figure 1.1 ignores a vital dynamic feature of real markets — the frontier moves out as there are new global and domestic innovations. This creates new laggards. Global frontier technologies are not immediately diffused to all firms, being first adopted (and if necessary, adapted to the domestic context) by the most productive firms in an economy, before diffusing to other firms (Saia, Andrews and Albrizio 2015).

Figure 1.1 – Diffusion and firm exits compress relative productivity^a

A simulation



a. The example assumes that exits are offset by entries, with entries more likely to be higher performing. The distribution of productivity performance is illustrative, with the assumed average relative productivity of any group relative to the most efficient organisation being 0.45 for very low performers (that is, productivity just less than half of the best performer), 0.6 for low performers, 0.755 for mediocre performers, 0.855 for medium performers, 0.925 for high performers and 0.975 for the frontier organisations. The changing shifts in the shares of organisations in each productivity grouping is assumed but does not represent large shifts in the standard deviation of the distribution of productivity levels across organisations. The average productivity of the 'after exits' case increases by about 0.16 deviations (based on the status quo distribution of productivity values) and by 0.35 standard deviations for the 'closing the gap' scenario.

The pace of diffusion differs across firms

There are many parts to firms' decisions about adopting innovations. Where diffusion consists of making an investment, this can give the business a 'technology'⁴ that looks similar to frontier businesses. But the investment entails costs, such as any equipment or software purchases, staff re-skilling, and organisational changes needed for adoption. If those costs are not adequately offset by increased returns, then adoption reduces the firm's income, though it may still increase labour productivity.

⁴ Technology is broader than tangible investments in machinery and equipment. It includes all the ways in which an organisation produces its output — their governance structures, skills, physical capital, intellectual property and so on.

Organisations vary in their capability to absorb existing technologies and in their need for them. So for some organisations, adopting an innovation later, if at all, may be a better strategy (Geroski 2000). This allows them to obtain new technologies at lower prices, to draw on a growing pool of people familiar with the technology and to use the lessons learned from early adopters, whether in Australia or more likely overseas. Waiting can also reduce the risk of committing to path-dependent technologies that may be sub-optimal in the long run.

For other businesses, diffusion of a productivity-promoting technology requires complementary investments and other changes to their processes, and the full set of investments may be too costly — particularly for small and medium enterprises (SMEs), which are the most common type of business in Australia (PC 2021d, p. 5). For instance, effective digitalisation of businesses requires skills and integration of systems, yet nearly 60% of Australian SMEs experience ‘bad digitalisation’ (MYOB 2022).

Some firms are ‘satisficers’, and do not necessarily want to advance much towards the frontier or have little realistic prospect of transforming their businesses. These might be pejoratively called ‘laggards’, but they can serve people’s lifestyle choices and may improve labour market efficiency in some cases.

... some of the laggards with limited scope for growth, such as some family businesses, may still support employment, in particular for workers with lower than average employability and in lagging regions. (Berlingieri et al. 2020, p. 20)

In meetings with various industry associations, the Productivity Commission was often told about business owners — typically of smaller businesses — who have little time to put aside to focus on innovation or future-looking business strategies. For these businesses, the impetus for change comes from external advice (by their accountants for example) or from impending closure.

Moreover, in some cases, a new technology or organisational innovation has limited applicability to many businesses, such that their absence is not a problem. For example, the take-up of working from home — spurred by lockdowns and COVID-19 infection risks — represented a new, or at least more frequently, adopted way of organising work. Its diffusion amongst businesses was variable, but in many instances, a low rate of adoption is desirable (or inevitable) given the nature of the businesses. Very few businesses in accommodation, food services and construction have any significant share of their workforce working from home as their businesses rely on workers being physically present at the location of production (PC 2021e, p. 16).

The Commission’s analysis of cloud computing further illustrates the complexity of firm variations in adoption of technology (McMillan et al. 2022). We found four groups of businesses — those who adopted cloud services and benefitted from them (*leaders*), those who did not adopt and should not have (*wise non-adopters*), those who adopted them but should not have (*‘naïve’ leaders*), and finally those that did not adopt, but should have (*true laggards*). A policy and economic environment that limits the significance of naïve leaders and laggards will tend to improve productivity.

Finally, the resources for being at the frontier are scarce in Australia, regardless of whether the organisation is private, public sector or not-for-profit. For example, one of the challenges for many social programs is that they rely on highly skilled and motivated staff and managers, who are in short supply, meaning that complete diffusion of best practice is not feasible.

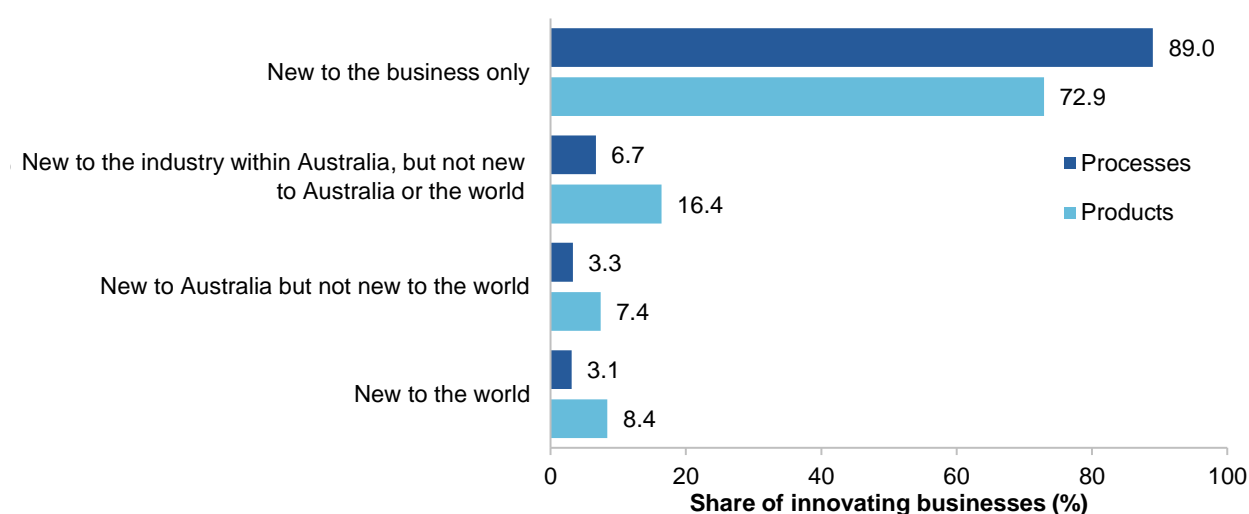
1.2 Innovation and diffusion in Australia

Most Australian businesses do not introduce new or *significantly* improved products or processes (the usual measure of innovation). For example, in the two years ending mid-2021, almost 80% of Australian businesses did not introduce any (significant) new good or service, and over 60% did not introduce a new process (ABS 2022c). And far fewer Australian businesses are at the global frontier in respect to innovation

— over the same period, more than 98% of businesses did not introduce any goods or services that were new to the world and almost 99% did not introduce any processes that were new to the world. Looking at this tiny group of firms therefore misses the bulk of those innovating.

When businesses do innovate, the vast majority of new products or processes are only new to the business — which is one measure of diffusion as such innovation draws on other established products and processes (figure 1.2).

Figure 1.2 – Most Australian business innovations are only new to the firm^a
Product and process innovation, 2 years ending June 2021



a. Process innovations include new or improved methods for producing goods and services; organisational forms; and marketing methods.

Source: ABS (*Innovation in Australian Business*, 2020-21 financial year, Cat. No. 8158.0).

Compared with other countries, Australia receives a mixed report card on innovation and diffusion. The World Intellectual Property Organisation paints a dismal picture of Australia as a weak diffuser — 78th in the world in knowledge diffusion and 52nd in terms of knowledge absorption (WIPO 2021, p. 47). However, the WIPO definitions of diffusion and absorption⁵ are problematic measures in the sense meant by this report because they only narrowly capture the ways in which diffusion and absorption of knowledge occurs in an economy. Accordingly, these measures have the same bias that surrounds typical narratives of innovation, accentuating high-technology and manufacturing, and ignoring the non-business sector and non-traded sector despite their pre-eminence in modern economies like Australia.

Better measures of diffusion and diffusion capability paint a more sanguine, albeit still mixed, picture of Australia's comparative diffusion performance.

Global comparisons of the uptake of certain digital technologies, such as business adoption of cloud computing and broadband connections, suggest that Australian businesses are moderate or fast adopters in some areas and slow in others. For example, in 2020 more than 70% of Australian businesses with employment of 10 or more people had purchased cloud computing services, which places Australia in the

⁵ This diffusion measure is a weighted combination of the IP receipts' share of total trade, production and export complexity, the high-tech export share and ICT service export share. The absorption measure is based on the weighted shares of trade for IP payments, high tech imports and ICT services, FDI net inflows as a share of GDP, and the share of research talent employed in the business sector.

top 5% of firms in the OECD.⁶ On the other hand, Australian businesses' take up of more advanced digital capabilities, like big data analysis and artificial intelligence (AI), lags most other developed economies (PC 2022a). The rate of AI adoption, for example, is relatively low with Australia in the 15th percentile among OECD countries in 2020.

Overall rates of goods and services (product) innovation — which includes new-to-the-world, new-to-Australia and new-to-the-firm innovations — among Australian businesses is about at average levels of OECD countries (OECD 2022b). Process innovation is higher than the OECD average. However, the product innovations implemented by Australian businesses are more likely than other OECD countries to be new-to-the-firm rather than new-to-the-world or new-to-Australia — indicating that diffusion, rather than novel innovation, is relatively more important in Australia (though new-to-the-firm innovation still accounts for about 50% of product innovation among OECD countries) (OECD 2022b).

Managerial capability varies, but generally lags other countries

While it can be difficult to accurately capture the level of diffusion, particularly for micro innovations, at the firm level, firms' management practices provide some indication of their capacity to make small productive changes. Firms using advanced management practices have been shown to be more productive across a broad range of countries (Bloom, Sadun and Van Reenen 2017, pp. 16–17; Bloom and Van Reenen 2007, pp. 1368–1371; Criscuolo et al. 2021, pp. 23–31; O'Neill, Sohal and Teng 2016), including Australia (Agarwal et al. 2014, p. 6497). Management training also has large and persistent effects on firm performance over time (Giorcelli 2019, p. 139). The OECD estimates that the productivity gains from upskilling managers could be three times higher than for upskilling workers,⁷ with significant gains even in less knowledge-intensive services like wholesale and retail trade and transport (Criscuolo et al. 2021, pp. 28–29).

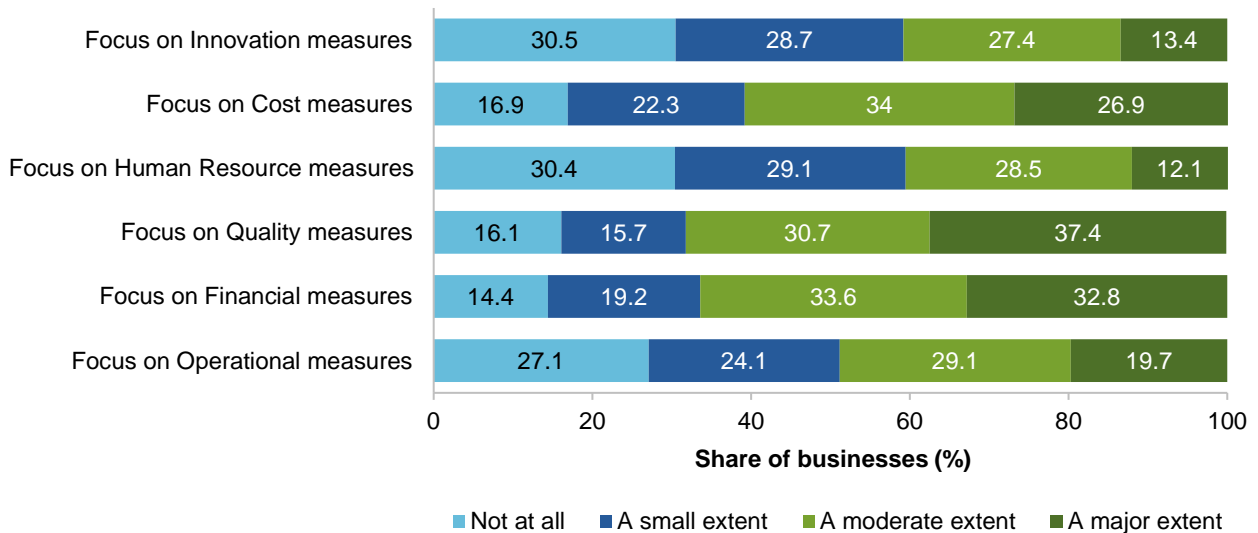
Evidence on the practices of Australian managers suggests that many do not examine key performance aspects of their businesses, which acts as a barrier to making changes (figure 1.3). A composite score of overall management capability among Australian businesses shows that capabilities are relatively low, at about 0.3 (with the range of possible scores being between 0 and 1) (Agarwal et al. 2019). An increase in the overall management capability score of 0.1 is associated with a 6.2% increase in labour productivity (ibid p. 28). However, there appears to be a gulf between actual deficiencies and perceived ones. In 2020, only 2.4% of Australian businesses said that shortages or deficiencies in business management skills adversely affected their core business activities.⁸ This suggests that approaches to improve management practices may need to go beyond providing skills but will also need to credibly reveal the deficiencies to managers who do not recognise they have any.

⁶ Based on the OECD dataset for ICT Access and Usage by Businesses.

⁷ Criscuolo et al. (2021, p. 28) estimated that the productivity gains for a medium productivity firm associated with upskilling 1% of the workforce, either managers or workers, as 3% for managers and 1% for workers.

⁸ Surprisingly, this result does not vary with business employment size, though the need for management sophistication might be expected to do so. The figures are drawn ABS *Business Characteristics Survey* from ABS Stat Data Explorer for 2020.

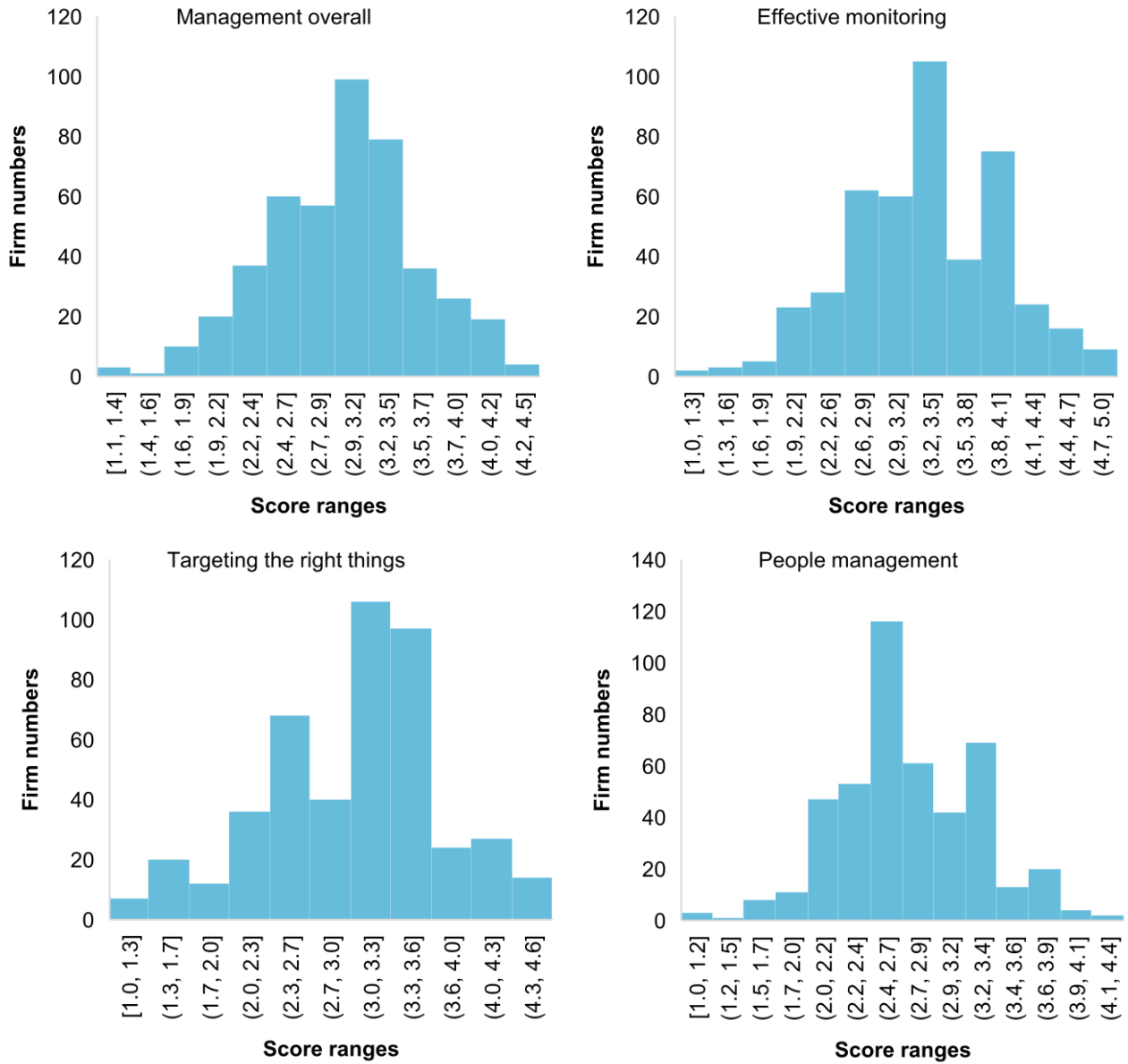
Figure 1.3 – Many Australian businesses undertake little or no assessment of their performance
2019-20



Source: ABS (*Characteristics of Australian Businesses*, 2019-20 financial year, Cat. no. 8167.0).

More detailed information is available on the distribution of performance in Australian manufacturing, which illustrates a wide dispersion in managerial capability across firms (figure 1.4). In addition, while entrepreneurship and managerial capability will always vary across business managers, the global evidence suggests that there are opportunities to improve average capabilities and with that, improve upon the slow accretion of better practices. In manufacturing, Australian firms are worse than the United States, which has higher average capabilities (figures 1.5 and 1.6). Empirical work suggests half of the productivity gap in manufacturing between Australia and the United States is the result of lower levels of management capability (Bloom, Sadun and Van Reenen 2017).

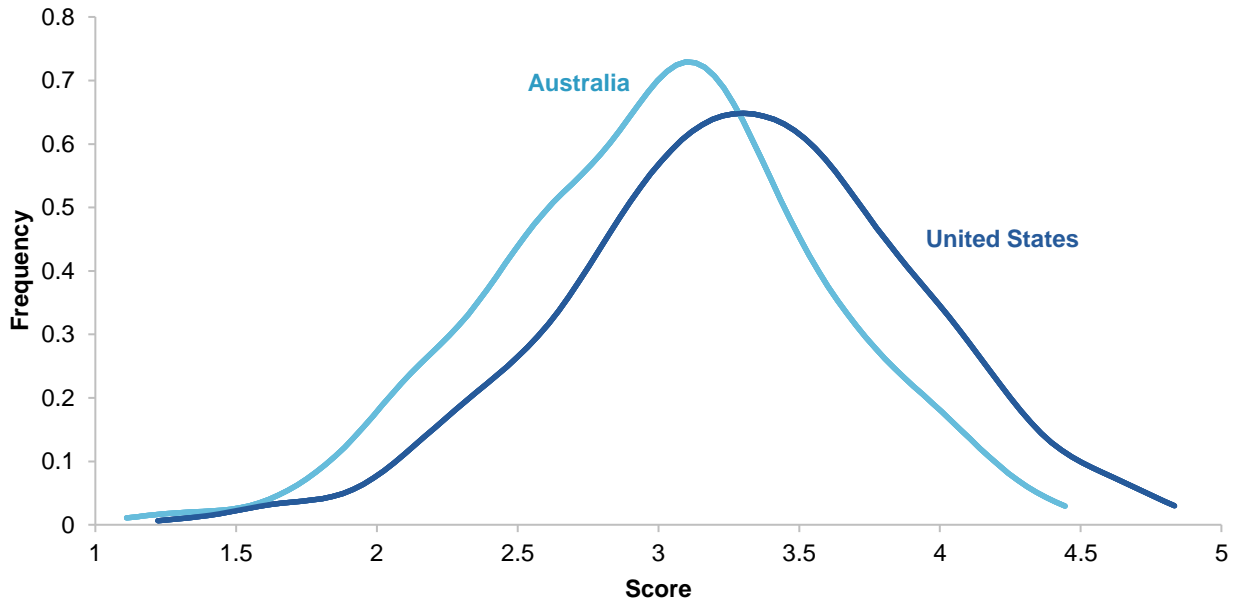
Figure 1.4 – There is wide dispersion in managerial capability in Australia^a
Manufacturing firms



a. Lower scores reflect poor management practices.

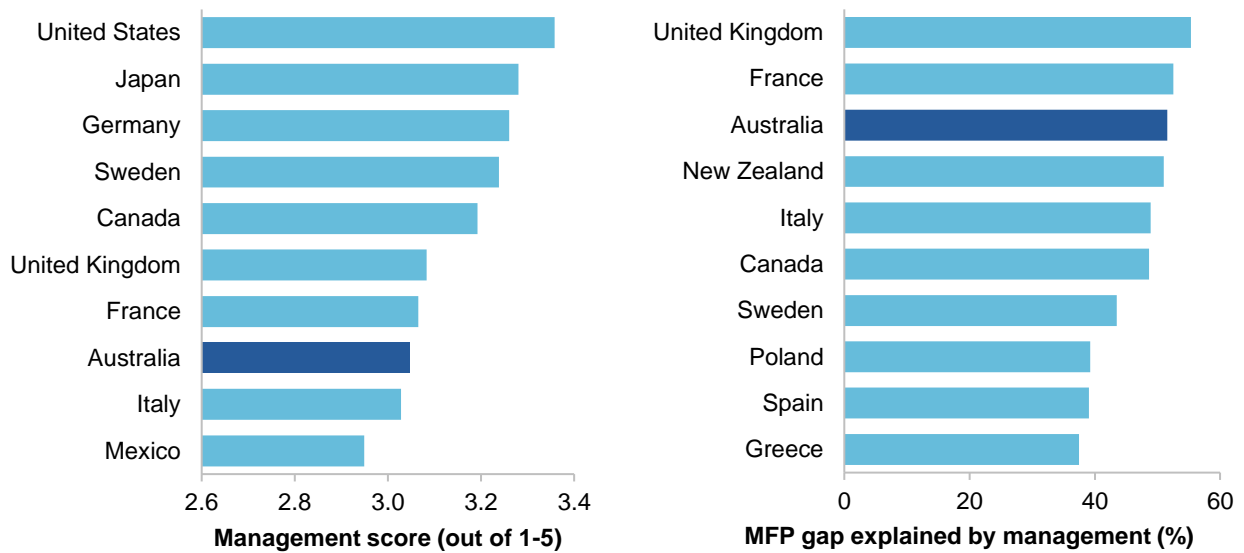
Source: Based on data from 451 Australian manufacturing businesses from the World Management Survey (Bloom et al. 2021) and described in Bloom et al. (2014).

Figure 1.5 – Closing the gap — there appears good scope for Australian firms to move closer to the best practice management frontier^a



a. Density kernels based on data from 451 Australian and 953 US manufacturing businesses from the World Management Survey (Bloom et al. 2021) and described in Bloom et al. (2014). Higher scores represent better management capability.

Figure 1.6 – Management capability in Australia lags behind our global peers^a



a. Relates only to manufacturing. The right-hand side chart explains the extent to which the management capabilities of businesses explain the divergence between manufacturing multi-factor productivity in each country and the United States.

Source: Bloom, Sadun and Van Reenen (2017).

Investment in capital with brains and job mobility have slowed

Beyond managerial capabilities, there are other factors that underpin diffusion of knowledge across Australian firms. Diffusion is also a product of investments in the resources that shift businesses' productive capabilities — 'knowledge-based' capital or capital with 'brains'. These investments include the acquisition of intangible capital in software, research and development, exploration, and artistic works, the skills of workers, and the knowledge embedded in machinery and equipment. While investments in the latter are often not seen as a part of knowledge-based capital, they facilitate learning through use and reverse engineering. (There are other forms of intangible capital, such as databases and managerial capabilities, but these are incompletely captured by official statistics.)⁹

Putting aside investments in workers' skills (which are not collected by the Australian Bureau of Statistics on the same basis as other knowledge-based investments), overall investments in capital with 'brains' has been falling in recent years, especially R&D and machinery and equipment (figure 1.7). In contrast, investments in the quality of labour — a summary measure of skill development and relevant to the creation and absorption of knowledge — has been rising consistently over the past 15 years (figure 1.8).

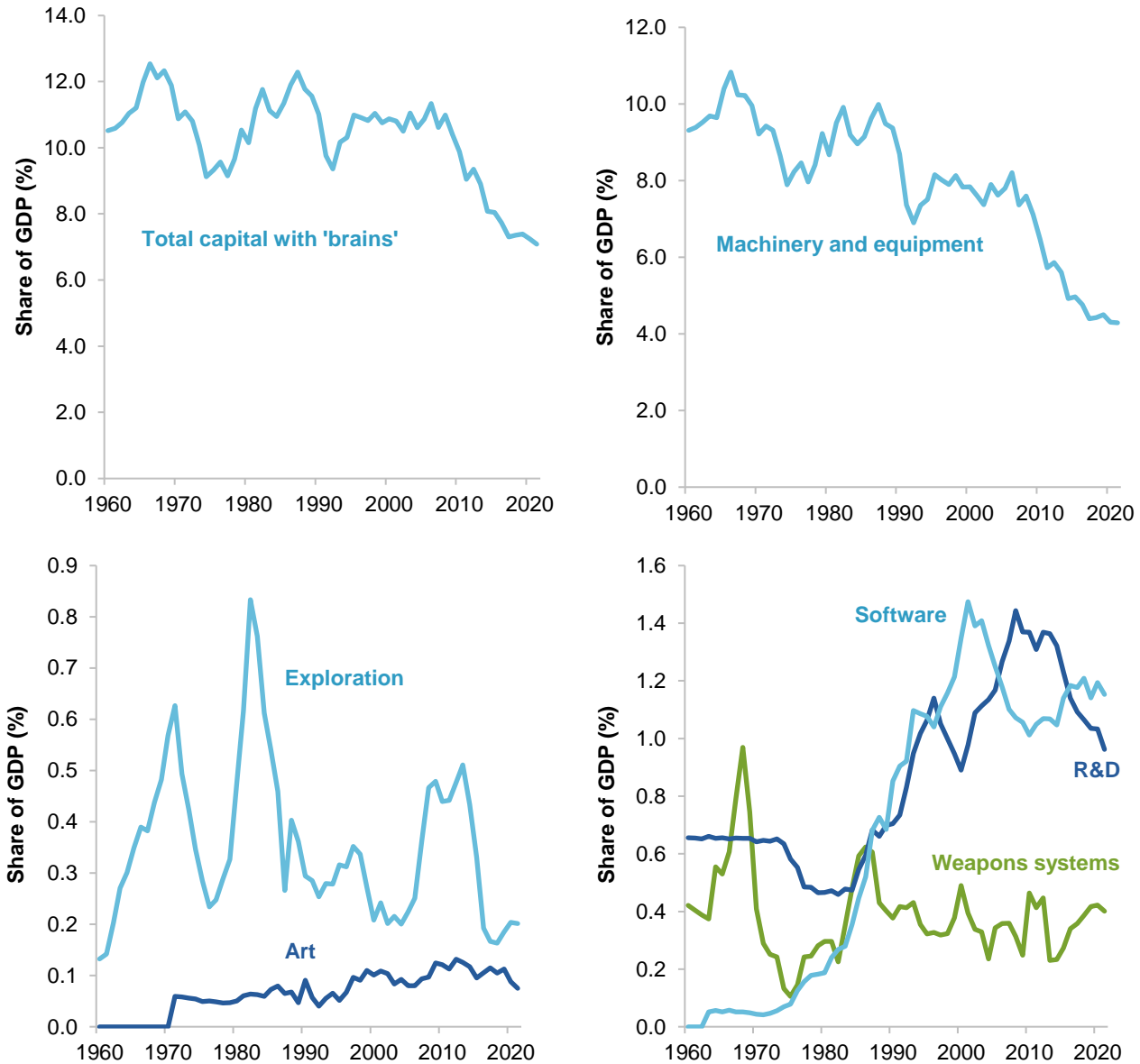
Worker mobility between firms is another conduit for diffusion of knowledge, regardless of whether that is precipitated by a firm exit. Workers acquire capabilities through formal learning and training, through job experience and with personal experiences. When they move between organisations, they carry those capabilities across. There are two gains for the recipient organisations. They acquire variety — people with new ideas compared with the incumbent workforce. They also benefit from matching efficiency. A worker who finds their current job does not fully use their skills searches for more compatible and often more highly paid jobs. If job mobility falls, especially for workers with less routine jobs, then this can disrupt this beneficial source of diffusion and innovation. The evidence suggests that job mobility has been falling in Australia.¹⁰

⁹ Figure 1.7 does not capture shifts in the nature of plant and machinery over time, such as, say, a shift from large mining trucks to supercomputers. Notably, while the mining share of equipment has fallen as a share of GDP, so has non-mining.

¹⁰ While labour mobility is likely to be a significant source of diffusion, it should also be recognised that high labour turnover reduces the incentives for businesses to provide formal training (one of the reasons why governments sometimes support industry training). Moreover, while knowledge unquestionably is carried by worker mobility, it is likely that the marginal benefits depend on the levels of skills of the worker and the source business. For example, the periodic movements of employees from one fast food franchise to another is unlikely to add much to the capabilities of the acquiring franchise.

Figure 1.7 – Capital with ‘brains’ has been falling^{a,b}

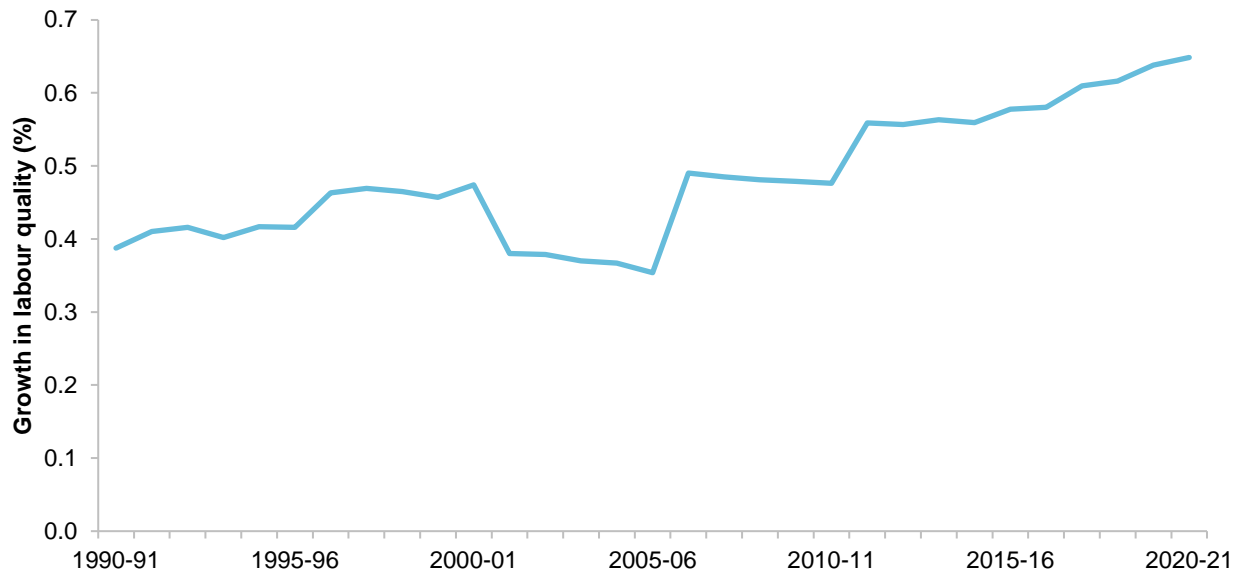
Capital spending as a share of gross domestic product 1959-60 to 2020-21



a. Knowledge-based capital spending is often defined as the sum of gross fixed capital spending on computer software, research and development, mineral and petroleum exploration, and artistic works. The individual shares of current price spending on these to current price gross domestic product is shown above. In addition, investment in machinery and equipment and weapons systems also embody knowledge. While this is partly an outcome of knowledge-based capital spending, much of these forms of capital are imported and provide an independent source of knowledge. Accordingly, the combination of all of these forms of capital are referred to as investment with ‘brains’. Some important aspects of such capital are not included, such as investments in workers’ skills and organisational capabilities.

Source: ABS (*Australian System of National Accounts*, 2020-21 financial year, Cat. no. 5204.0).

Figure 1.8 – The latent capabilities of labour has been increasing slowly but steadily^a
Annual changes in labour quality 1990-91 to 2020-21



a. The measure of labour quality is derived as the ratio of quality-adjusted labour inputs to hours worked.

Source: ABS (*Estimates of Industry Multifactor Productivity, Australia, 2020-21 financial year, Cat. no. 5260.0.55.002*).

Some indicators suggest slowing diffusion

Australia's poor productivity performance may partly be attributed to weakening diffusion of frontier technologies from overseas. The gap between global frontier firms and Australian firms (outside of the resources and financial market sectors) appears to have grown over time, with Australia firms catching up to the frontier more slowly than previously (Andrews et al. 2022). This is a general trend, observed for OECD countries more generally, with the concern that, while progress at the global technological frontier remains strong, there has been a breakdown in the diffusion 'machine' so that catch-up has flagged (Andrews, Criscuolo and Hansell 2019; van Ark, O'Mahony and Timmer 2008; OECD 2015b).

The widening gap between the global frontier and Australian firms does not appear to have occurred between laggards and leaders within Australia. The dispersion in labour productivity levels across firms has *fallen*, especially for wholesale trade, retail trade and construction (Campbell et al. 2019). Most of this reduction reflects catch-up by the bottom 25% of performers. This could imply improved diffusion within Australia and higher labour productivity growth than would have occurred had the gap not closed. However, it could also reflect decreasing firm entry rates in these industries as new firms are more likely to engage in experimental innovation activity, which increases dispersion (Campbell et al. 2019, p. 17) — implying a decline in innovation overall. The labour productivity gap of firms at the 75th percentile and 25th percentile is still wide.

Business entry and exits

Business exits and entries are a potentially important dimension of business dynamism. New entrants increase competitive pressures on incumbent firms, increasing their incentive to improve and reduce costs through innovation (Aghion et al. 2005). New entrants also purchase a disproportionate share of old physical capital, providing an opportunity for incumbents to sell existing capital and buy innovative new capital (Ma, Murfin and Pratt 2021). New and younger firms also tend to be innovative and more likely to adopt new technologies, with start-ups and entrepreneurs often bringing existing ideas to new places or industries.

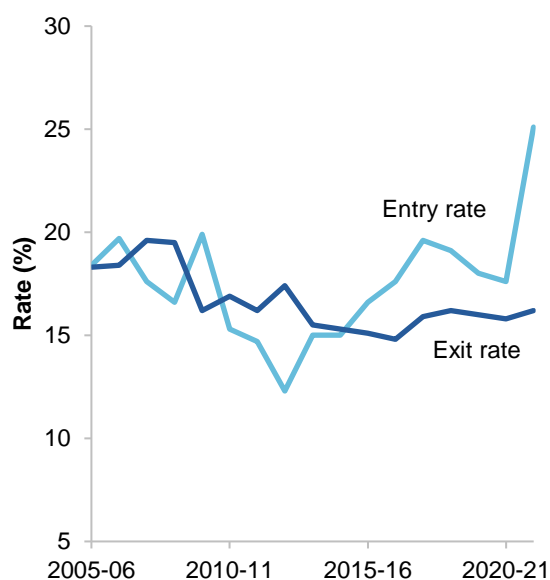
Recent empirical work also suggests that younger firms catch-up to the productivity frontier more quickly than mature firms (Berlingieri et al. 2020). However, not all new entrants thrive — many exit soon afterwards due to poor profitability and productivity.

There is some evidence of a weak downward trend in entry rates for employing businesses, but the rates are volatile (figure 1.9). While probably much less important for business dynamism, entry rates for non-employing businesses have *risen* significantly from 2012-13, partly due to the rise of self-employment in the gig economy, particularly in the ride-share and other transport industries — as highlighted in Ellis (2021) and this inquiry’s companion volume *A more productive labour market*. (The data for 2020-21 and 2021-22 are non-representative, reflecting the impact of COVID-19.)

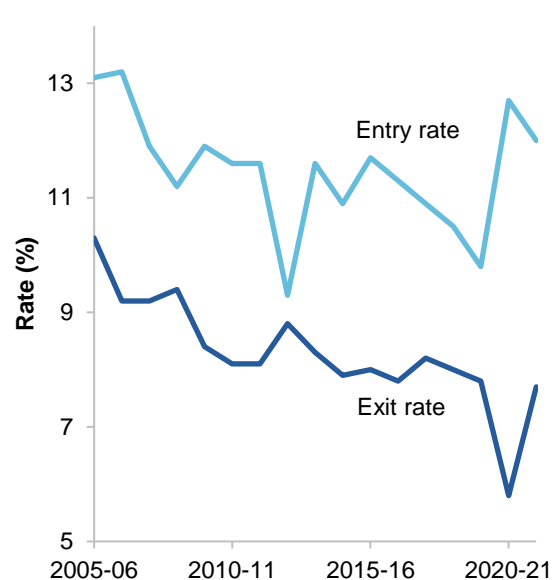
Figure 1.9 – Rates of business exits and entries showed generally declining rates prior to the COVID-19 pandemic^a

2005-06 to 2021-22

a. Non-employing businesses



b. Employing businesses



a. Based on measures of exit and entries over the ABS’s estimates of the counts of Australian businesses. There are minor discrepancies of numbers between successive statistical reports. The effects of the pandemic and various government policy measures to stimulate the economy explain the uncharacteristic results for 2020-21 and 2021-22.

Source: ABS (*Counts of Australian businesses, including Entries and Exits*, various years, Cat. no. 8165.0).

Firm exit rates in Australia have been trending down for employing businesses (and been largely static for non-employing businesses over the past five years). The downward trend partly reflects significant reductions in business-related bankruptcies and personal insolvencies (box 1.2), though the share of total business exits accounted for by such business failures is small. In any case, the changes in bankruptcy and insolvency laws in recent years have been to improve the efficient re-allocation of resources to avoid ‘fire sales’ and to enable fundamentally sound businesses to be restructured.

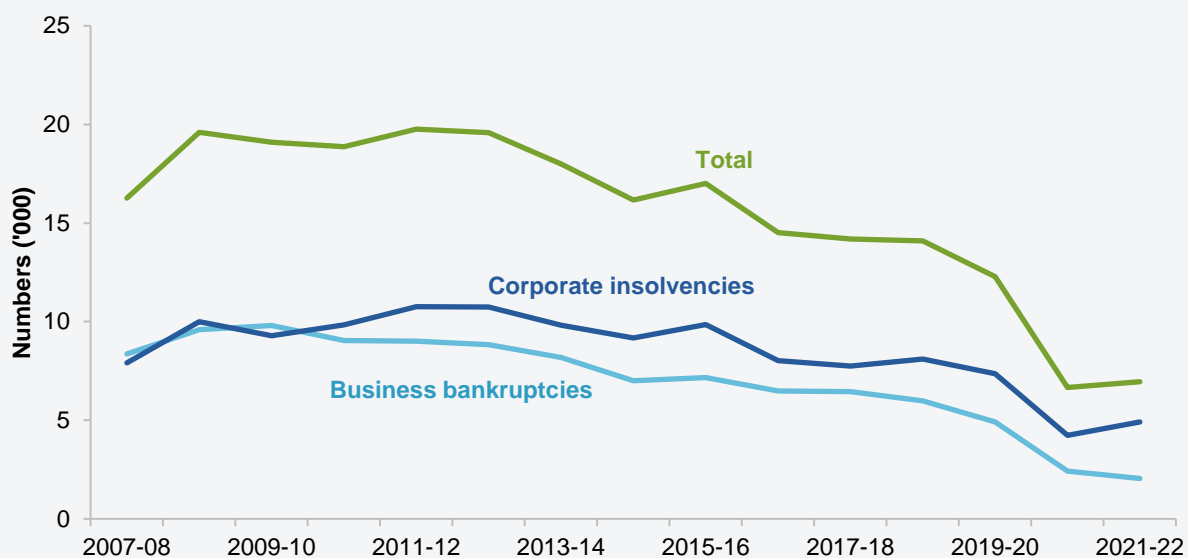
Box 1.2 – The role of bankruptcies and insolvencies in firm exit

In 2018-19, prior to the onset of the pandemic, bankruptcies and insolvencies were already at their lowest level since the late 1990s (RBA 2020, p. 33). By 2021-22, business bankruptcies and corporate insolvencies were less than half their 2018-19 levels (figure 1.10).

Several changes to Australia’s insolvency and bankruptcy laws in recent years will have contributed to the decline in business exits and will do so in future years. In particular, reforms to Australia’s corporate insolvency laws in September 2017 gave companies more breathing space to undertake a formal restructure rather than become insolvent (reforms introduced a safe harbour for company directors from personal liability for insolvent trading, and a stay on enforcement of ipso facto clauses).

Though its effects will not yet be obvious in the failure data, the introduction in January 2021 of a new formal debt restructuring process for small businesses is aimed at reducing exits of small businesses, while a simplified liquidation pathway is aimed at speeding up liquidation (and the subsequent reallocation of resources) for those businesses that do fail. The patterns in the past few years will also reflect the influence of pandemic business support programs such as JobKeeper and industry-specific supports, such as the COVID-19 Consumer Travel Support Program. Temporary changes were also introduced to insolvency arrangements during the COVID-19 pandemic as part of the package of business support measures, which reduced business failures below counterfactual levels.

Figure 1.10 – Business-related bankruptcies and corporate insolvencies declined between 2007-08 and 2021-22^a



a. The total is the sum of Business bankruptcies and corporate insolvencies. Non-business bankruptcies are excluded. The estimate of bankruptcies for 2021-22 includes an estimate for the last quarter of the year.

Source: AFSA (2022) and ASIC (2022).

Of the remaining exits, many will not entail failure as businesses can cease due to retirement of the owner, re-structuring or the sale of a profitable business. Nevertheless, many other exits reflect poor productivity and profitability arising from unanticipated demand and supply shocks or management deficiencies.¹¹

Declining rates of exits will be problematic to the degree that low productivity businesses survive, slowing the diffusion of best practice and using resources best allocated to more efficient businesses. While exits can be adverse for business owners and employees, they also build up entrepreneurial experience and encourage the acquisition of new skills.

The overall picture is that a smaller share of businesses exit than 15 years ago, particularly for employing businesses, which is where most activity in the economy is concentrated. Why that is the case and whether it really interferes with the 'diffusion machine' is not clear. Some evidence suggests that the number of businesses at the edge of financial viability ('zombie' businesses) has *not* risen as a share of all businesses since 2007, and that these businesses have had limited adverse effects on aggregate firm performance (Bowman 2022).

1.3 The policy levers for diffusion are different from those for novel innovation

Policies for business

Governments typically stimulate novel innovation through business tax concessions, grants and procurement policies, and via funding of public sector research institutions and universities. These policies recognise that innovation at the frontier involves especially high-risk activities, the returns from which are diluted because other firms can adapt the ideas without paying for them. These policies are also helpful for diffusion, because innovators absorb others' ideas; but they are not the main policy levers driving diffusion.

In general, the policy approaches to diffusion relate to the broader economic environment influencing firm behaviour and performance, which is a central concern of chapter 2 and other volumes of the Productivity Inquiry.

- Regulations can stifle or encourage diffusion. For example, a benign regulatory environment for foreign investment not only increases access to financial capital but is a conduit for adoption of best practice from businesses that often operate globally.
- Skilled migration does not just bring people with valuable qualifications into Australia, but people with tacit knowledge acquired from working in overseas organisations with more varied management approaches, technologies, and cultures than those available domestically.
- The education system is almost all about diffusion — spreading contemporary knowledge among people and giving them the skills to learn new ones.

Governments may themselves play a role in business knowledge diffusion through extension programs, regtech, and the provision of data and information that supports good decision making by firms (chapter 2).

Policies for non-market services

A large part of the economy and one central to many Australians' wellbeing is not in the market sector, but funded, organised and often directly provided by governments. In that case, governments act as the

¹¹ One survey of CEOs who had experienced a business failure found about one quarter attributed it to lack of leadership, 14% to a poor understanding of finance and about 10% to poor governance structures (Australian Centre for Business Growth 2018).

equivalent of business managers and shareholders in private entities, with the same challenges of management quality, adoption and diffusion. Their management quality and capacity to innovate, adopt and diffuse best practice is as important as it is for business (chapter 3).

In the case of the creation and diffusion of innovations for services provided or funded by government, different considerations come into play than for private organisations.

- The incentives are different — the model of vigorous competition between private business rivals that encourages adoption is hard to emulate for such services. Unlike most market activities, many government functions are delivered through monopolies. The productivity effects of insolvency and business exits on productivity are largely non-existent.
- There are also significant ethical issues in scaling up innovations unless they have a strong evidential basis. For example, the universality of service provision means that adopting a new approach to teaching affects the whole student population (who, given the compulsory nature of schooling, have no capacity to opt out as customers do for most private sector innovation). The social license to innovate is different in the public sector.
- Government agencies are more likely to have cultures antithetical to risk taking and innovation. Some risk-aversion may be justified when considering the potential human and taxpayer costs of errors. Nonetheless, the degree to which public service provision is overly conservative is something governments can change through new governance and recruitment arrangements.
- Scaling up of innovation also appears to be more challenging in the public sector than in the private sector because the specialised resources to replicate successful innovation are scarce, and because there are few people devoted to the task of explicit diffusion.
- Complex funding arrangements and split responsibilities between levels of government increase the transaction costs of diffusion, which have few parallels in business where joint ventures and collaboration are typically managed through robust contractual arrangements that maximise value for the parties. And while the multiple states and territories that make up Australia's federation can be a source of innovation, they can also make it costly to diffuse innovations (for example because of weak networking, incompatible computing systems and different bureaucratic processes).

Given these unique aspects, the policy antidotes for limited government diffusion (chapter 3) share only some commonalities with those that apply to private businesses (chapter 2). (Not-for-profit organisations straddle both groups, so that the lessons from chapters 2 and 3 will often be relevant.)

2. Enabling innovation diffusion in Australia

Key points

- ✳ **Promoting diffusion of established technologies and practices across firms and industries requires more generic policy settings than those that target ‘new-to-the-world’ innovation.**
- ✳ **Commercial and market settings ultimately provide incentives for firms to seek out and adopt innovations. But regulation and policy can either facilitate or unduly hinder the process.**
- ✳ **Adopting innovations developed overseas is critical to Australia’s productivity. Linkages with overseas firms via trade and foreign direct investment (FDI) give Australian businesses access to information and ideas about innovation from the global frontier.**
 - Reducing trade barriers and FDI fees is important to maintain this channel for diffusion.
- ✳ **A firm’s workforce — its managers and employees — determine its abilities to identify, evaluate and absorb external information and make the broader organisational changes needed to benefit from transformative technologies such as digital technologies.**
 - Skilled migrants often have knowledge of frontier technologies and practices and bring skills that are lacking in Australia. Measures to facilitate skilled migration would promote innovation diffusion.
 - Creating industry-agnostic research and training linkages to industry and removing barriers to university-industry collaboration enable researchers to apply their capacity-building knowledge and skills to industry.
 - Government training support should focus on transferable skills that augment the absorptive capacity of firms, such as digital and management skills.
- ✳ **Innovation diffusion depends on information. While industry organisations and business networks facilitate information flows and spillovers, businesses may benefit from more tailored information to help identify the need and opportunities for innovation.**
 - Data collected by government agencies can be used to help businesses benchmark their performance and provide insights that promote innovation. Benchmarking tools should be accessible (e.g. online) and include tailored results and case studies on best practice.
 - Government can directly increase the pool of knowledge available to businesses by requiring open access to government funded research and by partnering with intermediaries like industry associations.

As noted earlier, the obstacles to the diffusion of already known innovations and the policy levers to address these obstacles generally take a different form to those widely used to stimulate new-to-the-world innovation. In particular, the policies that promote diffusion of established technologies and practices in an economy tend to be more general and broad-based. They aim to affect all firms in all industries, not just those creating and commercialising new-to-the-world innovations.

These policies include:

- broad conditions that maximise the incentive for firms to experiment and adopt innovations
- facilitating the transfer of knowledge, skills and technologies from overseas
- building critical skills for firm-level innovation — management capabilities in particular
- enabling the flows of information that support good decision making.

Many of these policy areas are covered in companion volumes for this inquiry, as they relate to broader issues around creating a dynamic business environment (discussed in the *A competitive, dynamic and sustainable future* volume), flexible labour markets (*A more productive labour market*) and an education system that meets Australia's skills needs (*From learning to growth*). As such, while the relevant recommendations to improve these settings and their role in supporting diffusion are discussed throughout this chapter, the detailed analysis underpinning these recommendations are found in the respective companion volumes.

2.1 An enabling environment for diffusion of new knowledge and technologies

Framework conditions

The broad regulatory and financial environment in which businesses operate is important for diffusion. It shapes the incentives, resources and capabilities of firms to *adopt* established innovations and *adapt* them to their specific circumstances.

While decisions to adopt and adapt innovative product lines and processes predominantly rest with firms, governments can influence aspects of the environments in which these decisions take place, altering firm incentives and barriers to adoption.

Business and regulatory environment for innovation and its diffusion

Market conditions and exposure to competition

The relationship between competition and adoption of innovation works in several ways. Where businesses operate in a competitive environment, they face pressures to upgrade their product lines and processes (by reducing costs, or increasing variety or quality for consumers) or risk loss of market share to competitors that do so. Conversely, in the absence of competition, there may be less market pressure for businesses to innovate, but greater rewards for those who do.

Domestically, competition is not uniformly strong across product markets within the Australian economy. Some Australian markets are highly concentrated, including in sectors where scale economies are strong (such as supermarkets), firm entry is highly regulated (such as in banking), or competition is inherently weak due to natural monopoly characteristics (such as in electricity distribution and transmission).

But this does not, and need not, imply an absence of innovation. Increased market concentration at the aggregate level does not appear to result in lower firm entry — which would reduce sources of innovation

uptake (Bakhtiari 2020, p. 23). (See the Commission's companion volume on *A competitive, dynamic and sustainable future* for the Productivity Inquiry.)

However, exposure to international competition via trade has the potential to be an important source of innovation diffusion. Import competition provides local firms with an incentive to adopt innovations as a way to remain competitive, reduce costs and improve product lines and processes to maintain market share (Kiryama 2012, pp. 15–16).

Exports also play a role. For exporting firms, access to overseas markets can expose them to more intense competition, while increasing the potential returns to innovation adoption due to a larger market size and allowing firms to spread the cost of innovation over a larger market (Bloom, Van Reenen and Williams 2019, p. 177). Innovation uptake is strongly correlated with exporting, with exporters 7–10% more likely to introduce new or significantly improved products or processes than non-exporting firms (Tuhin 2016, p. 2).

Regulatory and administrative procedures

When done well, regulation can protect against harms without unduly affecting the incentive to innovate. Indeed, while often not intended, regulation can even encourage diffusion due to its effect on the capabilities of businesses. Single Touch Payroll and My Health Record (both discussed in the inquiry's companion volume *Australia's data and digital dividend*), and the growing importance of 'regtech' (PC 2020h, and discussed in chapter 3), have encouraged many businesses to go digital, or have lowered the costs of compliance, reducing businesses' administrative inefficiencies. Competition policy limits the market power of large dominant incumbents, facilitating entry and discouraging complacency.

Nevertheless, poorly designed regulation can reduce incentives for existing firms to adopt productivity-enhancing technologies and practices, and prevent new entrants from bringing innovative ways of doing things into an industry or country (OECD 2015a, p. 79). This is likely to be particularly limiting for labour-intensive service industries where innovation diffusion relies more on adoption of new business models and processes as a vehicle for experimentation (rather than large capital investment or traditional R&D) (PC 2020f, p. 37). For example, adoption of new approaches could be hampered by regulations that:

- create barriers to entry, for example, barriers to entry in retail pharmacy. On the one hand, pharmacy regulations eliminate competition from other potential providers, stifling technology, while conversely, the potential role of pharmacists to take on some clinical roles is limited by scope of practice restrictions
- reduce the scope to use technology as a replacement or complement to labour input, for example, because of workplace agreements
- curb incentives of business managers and directors to take risks with innovative new approaches, for example, because of personal or professional liability concerns, including in contracts with governments (AICD, sub. 44, p. 3; Consult Australia 2018, p. 8)
- limit scope to employ staff skilled in new technologies or processes because their qualifications or skills are not recognised in the relevant jurisdiction
- presume the use of a particular technology to enable compliance, or specify the means by which compliance must be achieved (compared with performance-based regulation, which specifies required outcomes or objectives) (Attrey, Leshner and Lomax 2020, p. 6)
- favour, through industry or product standards, incumbents using existing technology or processes
- limit capacity to use an existing building or site in an innovative manner, for example, because of the way the site is zoned or the need to undergo a lengthy redevelopment approval process.

As this list indicates, there is no single regulatory policy lever that drives innovation and diffusion. Rather, it is the 'hard grind' of regulatory design and implementation on multiple fronts that makes a difference, supported by strong frameworks like transparent regulatory impact analysis.

In many cases, progress is being made, such as Automatic Mutual Recognition of occupational licences, reforms to bankruptcy and insolvency arrangements over the past five years (box 1.2 in chapter 1) and the increasing awareness of the need for technology-neutral regulation. Overall, regulatory barriers to firm entry and expansion are generally lower in Australia than in most OECD countries (figure 2.1) (OECD 2018).

But the regulatory thickets caused by the accumulation (and combination) of past rules still limit the pathways for firm-based innovation. The unglamorous task of achieving greater regulatory neutrality in specific areas is arguably more important to the economy's innovative capability than many of the policies aimed at high-end new discoveries.

Figure 2.1 – Australia has relatively light administrative requirements to set up businesses but burdensome licensing and permit requirements^{a,b}

OECD Product Market Regulation Indicators, sub-categories 2018



a. Index scale from most to least competition friendly (0 to 6). 0 represents international best practice. Admin. requirements measures the costs of complying with requirements to set up new businesses; licences and permits measures the existence of measures to simplify licensing procedures. **b.** NSW data has been used by the OECD as representative for Australia.

Source: OECD (2018) *Product Market Regulation Database*.

Access to finance

Uptake of innovative new product lines and processes can be costly to finance. For firms with relatively low access to internal resources, including many small businesses and start-ups, access to external finance could be crucial to adopting new approaches. Well-functioning financial markets can therefore play an important role in supporting business innovation uptake (Levine 2005, p. 871).

Australian businesses frequently report access to external financing as a barrier to innovation. One in five businesses (19.7%) reported such problems in 2019–21 (figure 2.2) and this increases to almost 30% when considering only firms engaged in innovation.¹²

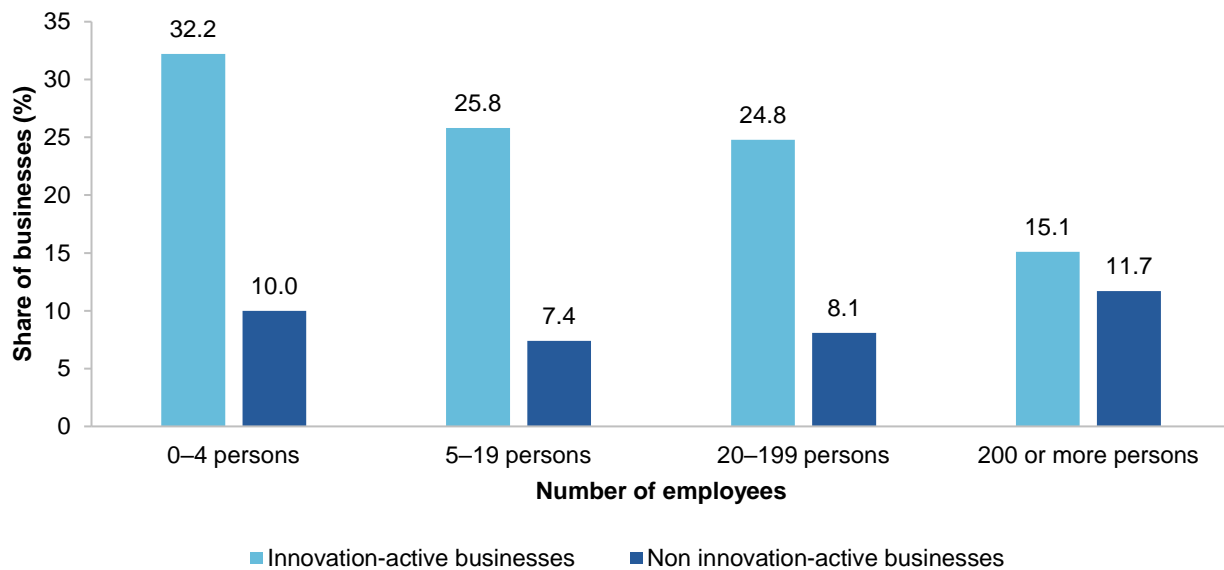
These difficulties are more acute for firms that are small and/or young (Kido et al. 2020, p. 7). Small businesses, in particular, typically do not have assets to use as collateral for debt finance, and unsecured

¹² This is likely a lower bound estimate as it does not capture firms that were dissuaded from even seeking finance.

finance may not be available (PC 2021d, p. 2) or may attract a higher interest cost, reflecting the increased risk for the lender (Connolly and Bank 2018). Small firms can also be more exposed to volatility than larger firms, which can further raise the risk premium included in their cost of finance (PC 2021d, p. 9). In Australia, the differential in the cost of finance (that is, the difference between interest rates charged on borrowed funds) for small and large firms is larger than the OECD average (OECD 2021, p. 95).

Figure 2.2 – Businesses frequently report access to additional funds as a barrier to innovation

Lack of additional funds as a barrier to innovation, 2019–21^a



a. Innovation-active firms are firms that reported one or more innovations, or firms with abandoned or ongoing innovation activities related to product or process innovations.

Source: ABS (*Characteristics of Australian Business*, 2020–21 financial year, Cat. no. 8158.0).

Australia’s prudential rules for lending to SMEs are more stringent than international standards, which partly explains the relatively lower availability of capital for SMEs — particularly for loans not secured by property (PC 2018, p. 35). Changing the underlying prudential requirements for SME business lending would significantly improve SME access to finance (PC 2018, p. 32). Changes to capital adequacy requirements for authorised deposit-taking institutions that commenced in January 2023 could support banks’ SME lending going forward (APRA 2022). In particular, the risk weights applied to SME lending that is not secured by property have been lowered from 100% to 75% for lending less than \$1.5 million in size, and 85% for lending above this amount (APRA 2021, p. 36). This could facilitate more access to finance by SMEs and more readily enable business uptake of innovation.

More broadly, Australia’s SME lending market is evolving as new lenders and loan products emerge and the diffusion of overseas innovations in the use of data and AI opens up new ways for many SMEs to access finance (PC 2021d, p. 2). This includes lending against intangible assets (such as invoices and other expected receipts) and on an unsecured basis. The Productivity Commission has observed that the relatively small funding market for newer lenders in Australia could constrain lending to SMEs via these channels (PC 2021d, p. 3). Recent government initiatives — such as the Australian Business Securitisation Fund (ABSF) — have sought to expand the pool of capital available to these lenders through securitisation. In addition to investing in funding facilities that are providing capital to SME lenders, the Australian Office of Financial Management — in administering the ABSF — has also supported more standardised reporting of SME loan data, which could facilitate more accurate

assessments of loan quality (by investors and credit ratings agencies) and therefore more willingness to provide capital to these lenders (PC 2022d). This could eventually further improve SME access to finance and support businesses that require additional capital to invest in innovation.

How these recent initiatives, including APRA's changes to capital adequacy requirements and the activities of the ABSF, have affected SME access to finance is unclear, as it is too early to fully assess their impacts across the Australian economy. The government should monitor the effects of these initiatives on SME lending over time to understand whether they are having the desired result and whether adjustments or further responses are required to reduce barriers in accessing finance. This monitoring may require more detailed and comprehensive data collection on business lending, for example by APRA, as existing datasets are relatively aggregated and typically do not capture SME lending by smaller lenders (which new market entrants tend to be) (PC 2021d, p. 46).



Finding 5.1

A business environment conducive to diffusion

The business environment provides the incentives and capabilities for firms to adopt innovations. The policies that shape the business environment to promote diffusion of established technologies and practices tend to be more general and broad-based than those that target new-to-the-world innovation. They aim to affect all firms in all industries, not just those investing in creating and commercialising highly novel innovations. Policies that promote openness and competition, implement well-designed regulation and improve access to finance all play a role.



Recommendation 5.1

An enabling environment for small business access to finance

The Australian Government should monitor the effects of APRA's changes to capital requirements and risk weights for loans to small and medium enterprises (SMEs) that are not secured by property, and the activities of the Australian Business Securitisation Fund, to understand whether they are having the desired impacts on SME lending. Adjustments or further responses could be required if barriers to SMEs accessing finance remain. APRA may need to collect more detailed data about business lending to enable the government to undertake this monitoring.

2.2 Facilitating the diffusion of innovations developed overseas

As a small open economy, Australia has a comparative advantage as an importer and adapter of advanced technologies and other productivity enhancing innovations, because our relative size means that it is not optimal for us to invent everything domestically (Ferris, Finkel and Fraser 2016, p. 13; Hemmings and Park 2017, p. 10). The diffusion of innovation from overseas is facilitated by trade and investment between Australian and foreign firms — particularly those firms that are at the global frontier for a given good or service.

Evidence from Andrews et al. (2022) showed that the productivity gap between the global frontier firms and Australian firms is growing over time. The implication is that the gains from diffusion of technology from overseas are getting larger and more valuable over time. An Australian firm can make huge gains simply by adopting processes and technologies from global frontier firms, or patterning its products and services on theirs. Nevertheless, only 3% of innovating firms in Australia introduce *processes* and 7% of firms introduce *products* that are new to Australia but not the world (figure 1.2). Most innovating firms use products and processes that are new to their firm only, implying that there may be potential for facilitating increased diffusion of innovation to Australia from foreign sources.

Trade connects Australian businesses to the global frontier

Importing and exporting goods and services are major channels through which trade can facilitate innovation diffusion to Australian firms. Information and ideas about innovation are more likely to come from one's supply chain, that is, from suppliers or from customer firms (figure 2.9, below). Given that most innovation comes from overseas, it is particularly valuable for Australian firms to be importing from (or exporting to) firms overseas.

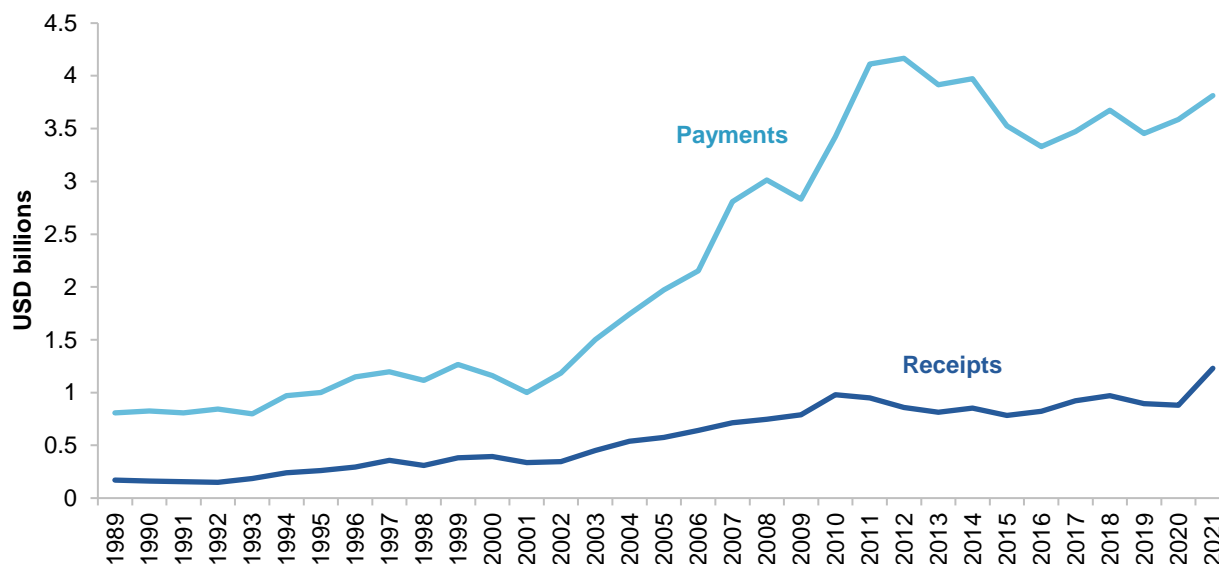
As importers, Australian firms can access frontier innovation via imports of capital goods and intermediate inputs that embody new technologies. Using imported goods can give firms new ideas for product lines and processes (Kiryama 2012, pp. 9–10), and facilitate innovation through imitation, 'leading to product cycle, in which products are first invented in some parts of the world, and then imitated in others' (Melitz and Redding 2021, p. 3). This also applied for services imports, which could become an increasingly important channel for diffusion of innovations from overseas as global trade in services increases in the future (as discussed in this inquiry's companion volume *A competitive, dynamic and sustainable future*). For example, in the technology industry, exposure to foreign ideas has already informed the creation of new products, platforms and services in Australia:

Australian marketplaces Catch and Kogan were created out of businesses originally developed on ebay.com.au. Similarly, the founders of Afterpay built and leveraged their knowledge of e-commerce on eBay to drive new innovations in payments while thousands of Australian pure play online retailers have been able to grow from small to larger businesses on eBay. (eBay, sub. 114, p. 2)

Complex capital goods, like semiconductors, require advanced knowledge and some vendors are willing to transfer this knowledge so that importers can effectively use these goods (Kiryama 2012, p. 10). Supply chains are a major source of innovation diffusion even in the service sector. Supply chain management systems like Systems Applications and Products (SAP) software create the potential for diffusion by facilitating information flows across businesses.

Firms can also import intangible technology in the form of intellectual property licences, 'increasing the pool of ideas' for innovation (Kiryama 2012, p. 14). Australia is a net importer of innovation, with payments for foreign intellectual property far exceeding the receipts of Australian intellectual property sales (figure 2.3).

Figure 2.3 – Australia imports significantly more intellectual property than it exports^a
Intellectual property payments and receipts



a. Charges for the use of intellectual property (BoP, current USD).

Source: World Bank (2021a, 2021b).

Barriers to trade take the pressure off domestic incumbents to adopt global best practice, by weakening competition and by lowering product variety. The Indian motor vehicle industry provides a vivid international example. Until the 1980s, the lack of import competition and diffusion meant that most Indian car manufacturers used 1950s vintage technology (Sagar and Chandra 2004, p. 2). Australia was never so bad, but there is good evidence that trade liberalisation promoted productivity in domestic firms (Bloch and McDonald 2001).

Indeed, Australia has successfully implemented reforms removing many of the traditional barriers to international trade in goods, such as import tariffs and quotas. But trade barriers can come in other forms. Anti-dumping regulations still provide significant protection for some narrow product classes. Many barriers to trade in services remain in place, particularly so-called ‘behind the border’ barriers, such as foreign licensing restrictions. The key question is whether these and other trade barriers (for example, quarantine provisions) have any material impacts. This is further discussed in the inquiry’s companion volume *A competitive, dynamic and sustainable future*, which recommends the government reduces such barriers by immediately reducing Australia’s statutory import tariffs to zero and progressively removing existing anti-dumping and countervailing measures.

Regulatory restrictions on particular types of technologies can also impede innovation diffusion from overseas — for example, outdated vehicle design rules that preclude a freight business from importing a vehicle that is more productive than currently permitted vehicles (Terrill, Burford and Fox 2022, p. 29). Slow approval processes for pharmaceuticals and other medical technologies can reduce the diffusion of interventions that are more effective than existing ones, or can prevent us from resolving a shortage of any given pharmaceutical, reducing the effectiveness (‘productivity’) of health care. Issues of regulatory barriers can be addressed by more responsively and quickly updating compliance requirements for industry or, in some cases, could be solved by more widely aligning with or accepting international standards, wherever practicable (see the Commission’s companion volume, *A competitive, dynamic and sustainable future*, which recommends that governments increasingly accept product standards adopted in other leading economies as ‘deemed to comply’, provided that a transparent review can be undertaken where a significant safety risk is identified).

For exporters, competition with goods and services from overseas provides exposure to new ideas and creates incentives to adopt those ideas. And access to larger markets can make some technology adoption more feasible, if the technology requires a larger scale to be viable (Bloom, Van Reenen and Williams 2019, p. 177). For firms in the business-to-business segment, they may be selling to overseas firms who introduce them to more advanced systems and expectations. There is strong evidence that as firms become exporters, their productivity increases significantly, in part due to the diffusion of innovation (Melitz and Redding 2021, p. 26). For example, exporting by SMEs in the manufacturing and professional, scientific and technical services industries is associated with an increased probability of introducing new-to-market innovations compared with non-exporting SMEs (Majeed and Breunig 2021, p. 15).

Finally, importers and exporters may learn about overseas innovations through more informal channels; participating in trade conferences, business networks, and so on (discussed in section 2.4). Other Australian firms may also learn about productivity-enhancing technologies or superior organisational and managerial practices via knowledge spillovers from other trade-exposed Australian firms (Ciuriak 2013, p. 36; Saia, Andrews and Albrizio 2015, p. 9) and simply inspecting new goods can generate ideas (Kiryama 2012, pp. 9–10). However, firms need to have sufficient ‘absorptive capacity’ to identify and incorporate these ideas and practices into their operations (section 2.3 and box 2.3).



Finding 5.2

Trade is an important source of knowledge diffusion

Trade enables Australian firms to access information and ideas about innovation from the global frontier, via their suppliers and customers. Imports are an important source of diffusion of intangible technology, with the value of Australia’s imports of foreign intellectual property far exceeding intellectual property sales. And for exporters, selling to overseas customers and competing with overseas firms provides exposure to new ideas and incentivises the adoption of product and process improvements.

Foreign direct investment is an important source of knowledge and expertise for Australian firms

Looking at trade between OECD countries, Bournakis, Christopoulos and Mallick (2018, p. 14) concluded that ‘imports together with FDI [foreign direct investment] are crucial vehicles for diffusion of foreign knowledge’ (see also PC 2020c, p. 7). This is because it involves a material level of control and influence¹³ by the foreign investor, who is involved long term and provides much more than a source of financial capital to firms. FDI brings expertise, new business models, technologies and processes as well as global connections, which can spread knowledge and good management practices to Australian firms. Majeed and Breunig (2021, pp. 12–13) found that for the average Australian firm, foreign ownership was nearly as likely to result in the firm introducing new-to-Australia and new-to-world innovations as firms conducting their own R&D.

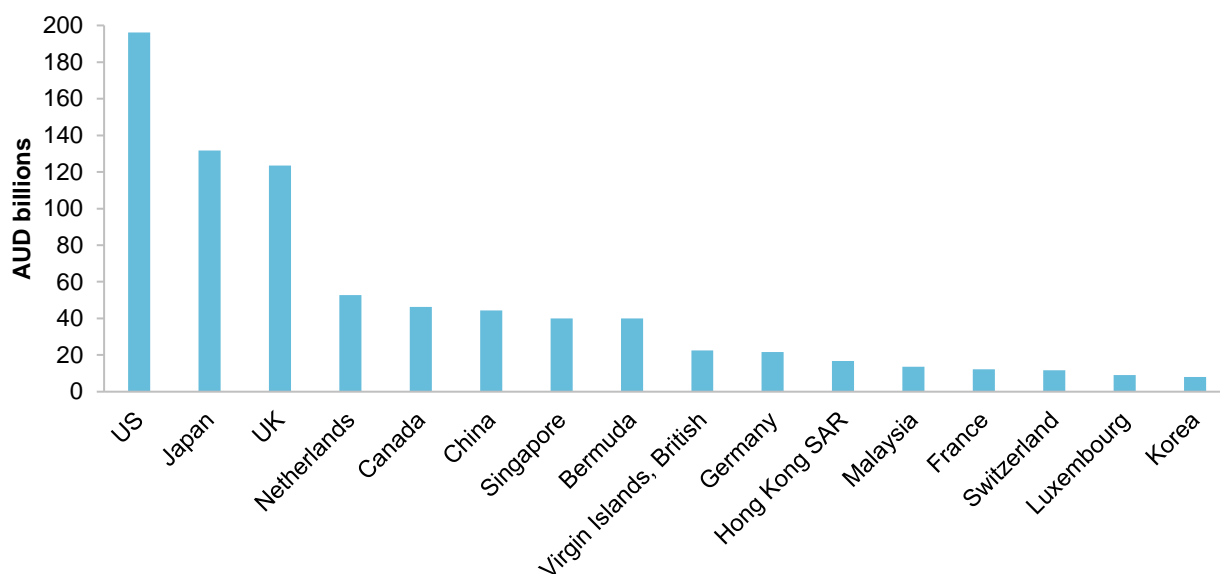
Just as international trade in goods and services facilitates diffusion from the global frontier via several interrelated channels, FDI can facilitate innovation diffusion to Australian firms via several interrelated channels. These include FDI that takes the form of investment in R&D; knowledge spillovers from

¹³ FDI is investment in an enterprise or asset where the foreign investor has control or a significant degree of influence over its management. Generally, investment is considered to be direct when an investor has 10% or more of the voting power in an organisation.

multinational corporations to domestic firms; and spillovers to competing firms in the same industry as those receiving FDI (Kiryama 2012, p. 12; PC 2020c, p. 58). Given that over 50% of Australia’s inward FDI comes from advanced economies — the United States, Japan, the United Kingdom, the Netherlands and Canada (figure 2.4) — it is likely that FDI creates significant opportunities for technology spillovers.

Figure 2.4 – Over \$450 billion of Australia’s inward FDI comes from the United States, Japan and the United Kingdom

Australia’s main sources of foreign direct investment, 2020



Source: Austrade (2021c).

In addition, although the literature focuses on inbound FDI as the more significant channel for diffusing innovations from overseas, outbound FDI also represents a potential source of new ideas and knowledge. For example, Australian businesses making direct investments in overseas companies may learn about and bring back product and process innovations that can be implemented in their domestic operations. This channel could become more important in the future as Australia increasingly exports equity capital, such as through outbound investment from our growing superannuation funds (noting that much of this will occur as outbound portfolio — rather than direct — investment, which would not have the same diffusion benefits).

Investment in R&D

Foreign investment in R&D can be a channel for diffusing innovation from the global frontier as it provides a mechanism for innovations to be adapted to the Australian market, as well as transferring skills and knowledge to Australian firms.

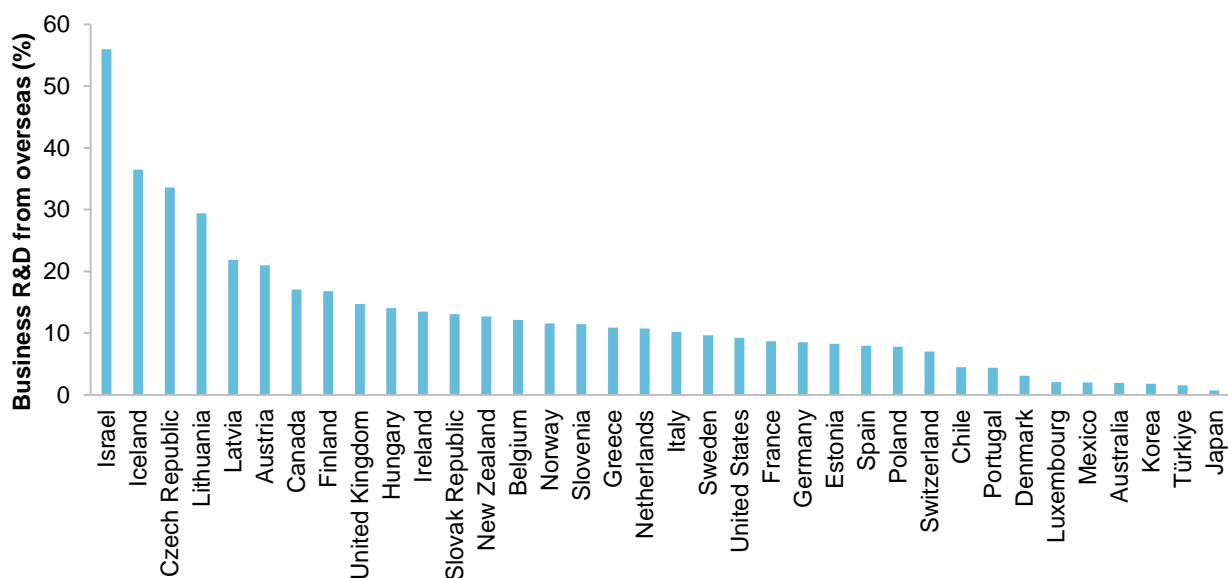
R&D can facilitate diffusion of innovation by being a channel for multinational corporation investment to adapt innovations to the Australian market. For example, Neoen, which has invested more than A\$3 billion in Australian renewables since 2012, ‘has also tested and deployed batteries at a large scale and with significant innovation. These projects were undertaken in collaboration with Tesla and network operators’ (Austrade 2021b). Similarly, Accenture has announced it will establish the ‘Accenture Adelaide Hub’, which ‘will include the development of National Security Operations and Cyber Defence capabilities, new Advanced Technology Centres of Excellence in areas such as Oracle, SAP, Splunk and Salesforce and Intelligent Operations capabilities to develop and deploy advanced analytics and artificial intelligence’ (DTI 2020). As

well as creating novel innovations, these initiatives can serve to diffuse ideas and expertise from abroad to the Australian market.

In 2019-20 about \$351 million invested by businesses in Australian R&D came from overseas, representing about 1.9% of the total spent by businesses on R&D in Australia (ABS 2021c), which is very low compared with the rest of the OECD (figure 2.5). This suggests that encouraging FDI may increase investment in R&D from overseas sources that bring the potential for innovation diffusion.

Figure 2.5 – Compared with other OECD economies, relatively little Australian R&D funding comes from overseas^a

Business expenditure on R&D from overseas sources, OECD 2019



a. OECD data: this table presents research and development (R&D) expenditure statistics performed in the business enterprise sector by industry according to the International Standard Industrial Classification (ISIC) revision 4 and by source of funds (business enterprise, government, other national funds, and funds from the rest of the world).

Source: OECD (2022a).

Knowledge spillovers

Inward FDI leads to interactions between multinational corporations and their domestic customers and suppliers that can generate spillovers — sometimes referred to as ‘vertical spillovers’ (Criscuolo and Timmis 2017, pp. 71–72). These can include spillovers of technology, innovation, technical know-how and management capability (PC 2020c, p. 58) that lead to improved general productivity for local firms (BCA 2010; McKissack and Xu 2016, p. 11; Roy 2016, p. 152). For example, multinational corporations may demand more or better-quality inputs from suppliers, and may directly share knowledge and technology and encourage the adoption of new practices to achieve this (box 2.1).

FDI can have a direct impact on Australian workers’ skills and knowledge as foreign-owned firms provide formal (such as seminars or courses) and informal (such as on-the-job) training to their workers (PC 2020c, p. 62). In the services industry, spillovers can occur when multinational corporations partner with training providers to improve the training and skills of their workers and of their customers’ and suppliers’ workers. For example, in 2022 Apple expanded its partnership with RMIT University and the University of Technology Sydney to deliver coding and iOS training in Australia (Apple 2022).

Innovation diffusion can also occur through ‘horizontal spillovers’ to their competitors. Local firms may ‘observ[e] foreign firms, or diffusion might occur from labor turnover as domestic employees move from foreign to domestic firms’ (Keller 2021, p. 10). A major potential channel for horizontal spillovers is the movement of workers between firms (section 2.4). However, empirical evidence of these spillovers is harder to observe (Gorg and Greenaway 2004, p. 1; Mistura and Roulet 2019, pp. 13–14), with some studies finding supporting evidence for horizontal spillovers (Javorcik and Spatareanu 2008, pp. 12–15) and some finding no evidence (Javorcik 2004, pp. 13–17; Newman et al. 2015, pp. 179–184).

Box 2.1 – Examples of FDI that potentially yielded broader spillovers

Foreign investment creates potential channels for knowledge spillovers, such as:

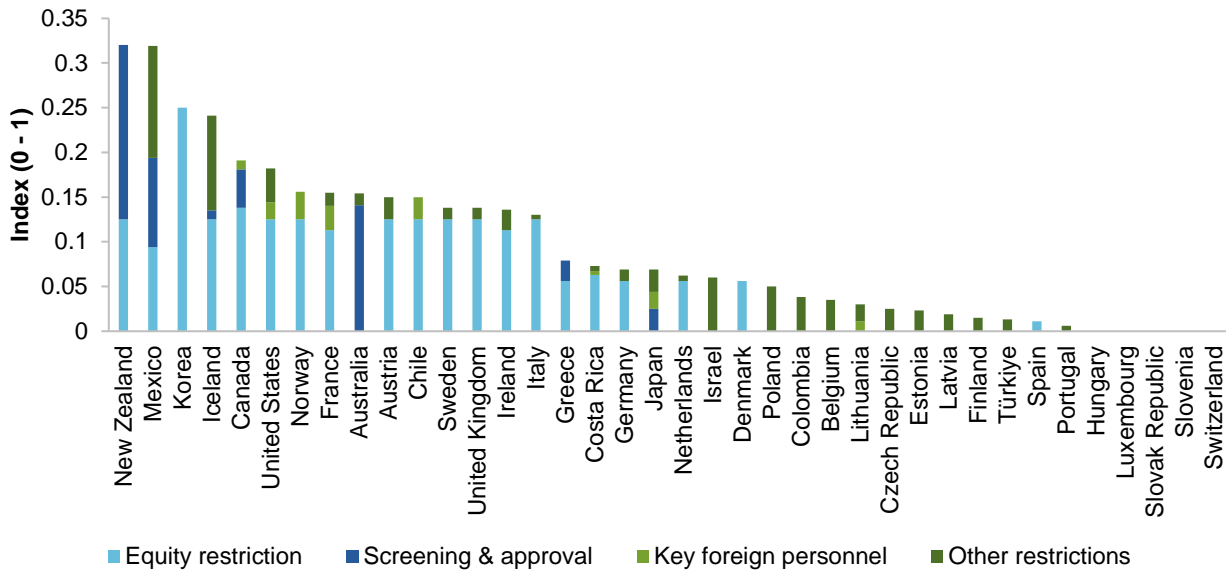
- spillovers from multinational corporations’ FDI that creates hubs and networks for local firms:
 - GE Additive, a subsidiary of GE, has partnered with the University of Sydney to ‘establish capabilities in metal additive manufacturing technology at the Sydney Manufacturing Hub, a space for training specialists and academics working in additive manufacturing, and the incubation of small to medium manufacturing enterprises’ (University of Sydney 2020)
- spillovers from multinational corporations sharing capital goods, infrastructure and expertise:
 - Mitsubishi Heavy Industries has invested in Australian Green Hydrogen and Green Ammonia projects (MHI 2020)
- spillovers from multinational corporation investment in R&D:
 - IP group (UK-based) and the Clean Energy Finance Corporation have ‘invested in Hysata ... [whose] advanced electrolyser technology has the potential to significantly improve the efficiency of hydrogen production’ (Austrade 2021a).

Government has a role to play in FDI regulation

The Australian Government has an important role to play in keeping barriers to FDI low. Australia’s foreign investment approvals process is seen to impose more significant screening processes than other OECD economies (figure 2.6) (IMF 2021, p. 22). These screening processes have been tightened in recent years for a range of reasons, including during COVID-19. These restrictions arguably create an additional burden — in time, compliance cost and uncertainty — to potentially desirable investments.

The Australian Government also sets application fees for foreigners seeking to invest in Australia (regardless of whether the investment is allowed to proceed). As discussed in the inquiry’s companion volume *A competitive, dynamic and sustainable future*, these fees are in excess of recovering the costs incurred by government in assessing applications and they continue to rise, which poses a risk of chilling FDI flows and lowering the associated productivity benefits. That companion volume notes that FDI application fees should not be used as a tax base and recommends that adjustments (such as indexation to investment thresholds and changing fee tiers) should be made to fees for FDI into agricultural land assets to bring them in line with other forms of investment.

Figure 2.6 – Australia’s FDI restrictions are mostly screening and approval^a
OECD FDI Regulatory Restrictiveness Index, 2020



a. Scores range from 0 (open) to 1 (closed).

Source: OECD (2022c).



Finding 5.3

FDI brings knowledge and new technologies into Australia

Foreign direct investment (FDI) is a critical channel for diffusing knowledge and technologies developed overseas to Australian firms. While Australia is very open to foreign investment, with relatively high FDI as a share of the economy, its FDI screening and approval processes are viewed as more restrictive than in other OECD countries. Australia’s FDI fees are in excess of cost recovery and could risk chilling FDI flows.

2.3 Diffusion through human capital

Building Australia’s human capital can assist diffusion

The skills and knowledge embodied in the workforce — in economic terms, the stock of human capital — is fundamentally important for innovation adoption and productivity more broadly. Human capital is the technical and tacit knowledge of a firm’s workforce and management, which can be built through channels such as formal education and work experience, and through connections and interactions with other businesses, organisations and networks. It is a critical component of a firm’s ‘absorptive capacity’ (box 2.2) — that is, a firm’s ability to learn from and capitalise on the innovation and research of others (Cohen and Levinthal 1989, pp. 569–570).

Box 2.2 – Human capital is the foundation of firms’ absorptive capacity

Human capital can improve a firm’s absorptive capacity in several ways.

- **Having an in-house research capacity.** This can increase a firm’s ability to identify and recognise the value of new, external information; assimilate it; and apply it to their circumstances. For example, undertaking R&D can facilitate innovation adoption to the extent that an existing research capacity lowers the cost of finding and learning about existing technologies (Bloom, Van Reenen and Williams 2019; Cohen and Levinthal 1990, pp. 148–149). In a meta-analysis of 241 studies on innovation, knowledge transfer and absorptive capacity, Zou, Ertug and George (2018, pp. 97–98) confirmed statistically significant positive relationships between measures of absorptive capacity and innovation, as well as between absorptive capacity and the ability of a firm to recognise the value of, assimilate and apply external knowledge.
- **Having employees with sufficient technical and tacit knowledge.** The skills and knowledge embodied in a firm’s workforce is also an important factor in how easily a firm can identify new and existing technologies, learn the principles of how they work and how to use and adapt them to the firm’s specific circumstances. While traditional innovation policy tends to focus on the stock of researchers capable of undertaking R&D, the successful diffusion and productive use of new technologies also relies on the capabilities of the workforce more broadly (Criscuolo et al. 2021, p. 11; Griffith, Redding and Van Reenen 2004, p. 890). Technical and tacit knowledge allows workers to identify and learn about new technologies and practices, and to adapt them for the firm’s specific needs and market. While this can mean employing researchers, engineers and technicians, firms can also access needed skills and capabilities through collaborating with or contracting out their innovation needs to other businesses, research institutes and universities.
- **Having employees with specific frontier knowledge.** For example, a firm’s employees may know about existing technologies because of prior work experiences and connections with other businesses. In fact, businesses get most of their ideas for innovation from their own employees or from businesses owned by the same company (ABS 2022a). This is in large part a result of workers moving from one firm to another and bringing the ideas and approaches of their previous firm to their new employer.
- **Having high-quality managers and organisational capital.** A firm’s management is an important component of absorptive capacity. Firms may need to adapt and re-organise production processes and workflows to make the best use of newly adopted technologies. While this is particularly the case with more complex technologies like IT and digital technologies (Andrews, Nicoletti and von Rueden 2020, p. 10; Bloom, Sadun and Reenen 2012, pp. 196–197; Pellegrino and Zingales 2018, pp. 14–23), better management — acquired through training or bringing on people with the necessary management experience — independently increases productivity. Better management also complements productivity gains realised from technology transfer, increasing the benefits from adopting technologies embodied in capital goods (Giorcelli 2019, pp. 139–140). More generally, a more adaptable and creative workforce will be better able to adjust to new processes and products.
- **Having diversity in the managerial cohort.** Increasing the diversity of managers in firms can improve the variety of skills, perspectives, tacit knowledge and innovative ideas within firms. Economic theory predicts that too little diversity may prevent complementarities arising between different skill sets, knowledge and practices (Alesina, Harnoss and Rapoport 2013, p. 2). There is an observed productivity premium associated with greater diversity amongst managers (Criscuolo et al. 2021, pp. 32–39) — though it should be noted that management diversity may be correlated with other productivity enhancing recruitment practices, making the size of this premium unclear.

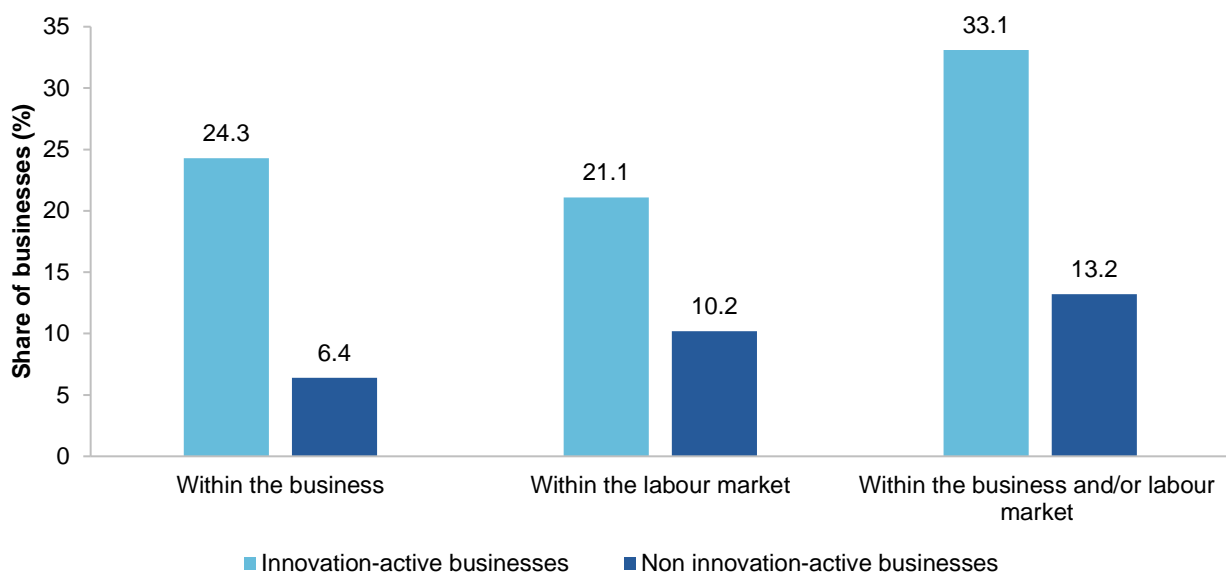
The quality of a firm's management is also a factor in how successfully new technologies are adopted and used by the firm. Managers have a disproportionate role in firm-level productivity to the extent that they are responsible for 'deciding what to do' and 'getting the organisation to do it' (OECD 2019a, p. 8), including decisions about innovation.

In Australia, innovation-active businesses report more frequently monitoring Key Performance Indicators (KPIs), offering performance bonus schemes and employing Principal Managers under the age of 50 years compared with non-innovation-active businesses (ABS 2017). Moreover, better management practices increase the likelihood that firms will introduce new-to-market innovations (Majeed and Breunig 2021, p. 12), or innovate at all (Gahan et al. 2016, p. 60).

Lack of skills and management capabilities is a barrier to the diffusion of innovations

A high proportion of Australian firms report a lack of skilled labour as a barrier to innovation (figure 2.7), both within their business and in the broader labour market. About one third of innovation-active firms¹⁴ report that a lack of skilled labour is a barrier, suggesting that a perceived skills deficit constrains the extent and/or types of innovation undertaken even by businesses that are already innovating.

Figure 2.7 – Firms report a lack of skilled labour as a barrier to innovation^a
2019–21



a. Innovation-active firms are firms that reported one or more innovations, or firms with abandoned or ongoing innovation activities related to product or process innovations.

Source: ABS (*Characteristics of Australian Business*, 2020-21 financial year, Cat. no. 8158.0).

Moreover, businesses that are not actively engaged in innovation are also constrained by a lack of skilled labour, suggesting that a lack of appropriately skilled workers may also deter businesses from innovating in the first place. Skilled labour gaps are felt more acutely as a barrier to innovation by SMEs than larger firms. As noted by the Australian Small Business and Family Enterprise Ombudsman (ASBFEO):

¹⁴ An innovation-active business is one that introduced any type of innovation and/or had innovation that was still in development or abandoned during the survey reference period (here, the two years ending 30 June 2021).

It is difficult for small businesses to take up technology opportunities without adequately skilled staff. (ASBFEO, sub. 64, pp. 3–4)

Another area of skill shortage, and one that may be less obvious to firms, is in management skills. As argued in chapter 1 of this report, and previously discussed by the Commission (PC 2020g, pp. 20–22), limited management capability may be holding back Australia’s productivity growth. Consultations undertaken for this inquiry provided insights into some of the consequences for innovation of poor management capability.

Managers may struggle to re-organise their operations to make the most **effective use of adopted technologies**. For example, the Australia Retailers Association (ARA) suggested that within their industry:

the COVID-19 pandemic, coupled with a huge appetite for digital transformation and use of digital technologies, drove an increased online presence among their members, followed by a “second wave” of technology adoption to deal with problems arising from systems that were hastily put in place during the pandemic. (pers. comm. 6 June 2022)

A recent survey of 1500 Australian SMEs showed 59% of surveyed firms reporting that adopted digital solutions were hindering them in some way, suggesting that the firm had not successfully integrated the innovation into its existing processes. Moreover, 42% of surveyed businesses had given up on using some digital business solutions (MYOB 2022). This points to the risk that persistent gaps in management capability may lead some firms to ‘over adopt’, or fail to benefit from adopted technologies, potentially deterring future innovation.

Moreover, limited management capability may mean firms fail to fully **realise the benefits of their technology innovations**, even when the firm is at or near the global technology frontier. For example, the Interactive Games and Entertainment Association (IGEA), which represents the video games industry in Australia and New Zealand, suggested that while the industry was at the global frontier in terms of technical skills, some start-ups are held back by management experience. According to IGEA, the ‘sector does not need help to get on top of the latest technology or techniques for making games ... it’s the boring things — management, business skills — that [their members] may not always prioritise as much’ (IGEA, pers. comm. 7 June 2022).

The Council of Small Business Organisations Australia (COSBOA) suggested that smaller firms do not have **time to allocate to up-skilling themselves as managers and owners**, because they often prioritise training their staff first (COSBOA, pers. comm. 9 June 2022).



Finding 5.4

Management capability for successful technology adoption

Limited management capability is holding back some businesses from making good adoption decisions and from getting the best outcomes from their investments in developing and adopting new technologies. Firms with stronger management are more likely to make good decisions about whether or not to adopt new technologies and practices, and when and how intensively to adopt them. Such firms are also more likely to be able to make the broader organisational changes that are needed to benefit from transformative technologies such as digital technologies. Despite a huge appetite for digital transformation in many industries, skills and management capability gaps (and a lack of tailored information) has seen some firms lose out from adopting new digital technologies, reducing their willingness to pursue future productivity-enhancing innovation.

Governments play an important role in building the human capital that enables diffusion of innovations

Governments play a pre-eminent role in developing the skills of Australians. Skills are a conduit for transferring new knowledge as well as information about how to use novel innovations. Governments' role extends beyond funding and managing the education system (schools, vocational education and training (VET), and universities) to immigration policy.

Nevertheless, the design and funding of the education system is pivotal to innovation and diffusion. Increasing the attainment and quality of education, including early childhood education, schools, higher education and VET, increases workers' capacity to identify and make productive use of new technologies and practices. A highly skilled workforce may also make Australia a relatively more attractive destination for foreign investment (PC 2020c, p. 54), and for investment in projects with high skills requirements. The Productivity Commission has undertaken a more detailed assessment of Australia's education system's role in skills formation in this inquiry's companion volume *From learning to growth*, and also through a review of the National School Reform Agreement.

Skilled migration

Skilled migration is viewed narrowly as a means to resolving short-term skill needs. But more broadly than this, skilled migration is also a way of diffusing innovation and best practice among Australian businesses. Businesses can be conceived as experimental laboratories in delivering goods and services to consumers, so it makes sense to understand the lessons from as wide a variety of experiments as possible, particularly those overseas. Australia's skilled migration policy will therefore be central to the diffusion of innovation and future productivity performance.

As previously discussed, one of the key ways that firms learn about innovations is through the normal churn of workers between firms in an industry. When hiring a worker that has been working for a competitor, or another segment of the industry, a firm may learn about new ways of doing things, techniques or equipment that it was not aware of. Australian firms find more innovation ideas from their own workers than from any other source (detailed in figure 2.9 below); and for many of those workers, their innovative ideas are built on knowledge and experience from their previous employers. 'Knowledge spillovers' from the movement of workers between firms has been documented to be one of the main ways that technology firms learn about innovation and grow their productivity in the Silicon Valley, for example Saxenian (1996).

In many industries, the most technologically advanced firms in the world are overseas, and the majority of innovations are taking place in firms overseas. When local firms employ skilled migrants, they are also bringing in some of the knowhow and ideas from overseas. For example, analysis from New Zealand finds that the share of recent, high-skilled migrants (or returnee New Zealanders) in a firm is significantly and positively associated with innovation. In particular, firms that employed returning New Zealanders were more likely to introduce innovations that were new to New Zealand (McLeod, Fabling and Marr 2014, pp. 21–25).

In addition to knowledge of specific innovations from overseas, skilled migrants also bring valuable skills that may be in short supply in the domestic market, including skills that limit firms' ability to innovate (figure 2.7). There may even be specific skills that only exist overseas in particularly innovative areas. As noted by the Business Council of Australia:

... it will continue to be the case that much of the innovation occurs offshore, and the new skills supporting that innovation will first be developed offshore. (BCA, sub. 16, p. 9)

The Productivity Commission considers skilled migration policy in a companion volume to this inquiry, *A more productive labour market*. That report recommends that the government shifts away from overly restrictive and inflexible occupation lists for employer-sponsored temporary and permanent skilled migration. Instead, the government should implement wage thresholds for employer-sponsored visas, whereby employers can sponsor overseas workers in any occupation as long as they are paid above the relevant threshold (with a lower threshold for temporary migration and permanent migration thresholds to increase with age).

Implementing this recommendation would mean that firms could hire skilled migrants with any skill or knowledge that they would be willing to pay above the wage threshold for, without waiting for a skill list to be updated. But importantly, such a change would also allow firms to hire workers with valuable knowhow, even if their skills on paper do not seem to be very different from local workers. The local beer manufacturer who hires an engineer from a plant in Europe is aware that they are thereby gaining new knowledge. If the firm judges any worker's knowledge and skills to be worth paying a substantial premium for, that type of worker would qualify for skilled migration under the proposed changes. These changes to skilled migration policy would clear the path for substantially more diffusion of innovation from overseas.

Researchers in industry

For firms engaging in more technical or adaptive types of innovation, an in-house research capacity may be needed to better identify and evaluate new information and apply that information to their circumstances. For such firms, employing researchers may be a particularly important component of their absorptive capacity.¹⁵ Increasing the supply of industry-ready researchers may complement other government incentives for firms to undertake in-house R&D activities via industry policies such as the Research and Development Tax Incentive (box 2.3).

Box 2.3 – Absorptive capacity and the R&D Tax Incentive

While business investment in R&D is widely recognised as a crucial input to technological innovation — particularly highly novel innovation (Majeed and Breunig 2021, p. 2) — it also plays a role in innovation *diffusion* through two channels. First, business R&D may involve adapting existing innovations to fit a firm's specific circumstances or market. Second, undertaking in-house R&D may increase a firm's ability to identify and recognise the value of new, external information, to assimilate it, and to apply it in their operations. To the extent that this lowers the cost of learning about new technologies, R&D can facilitate innovation adoption and catch-up to the national frontier (Bloom, Van Reenen and Williams 2019; Cohen and Levinthal 1990, pp. 148–149).

In Australia, the main policy lever for business R&D — and for business investment in innovation more broadly — is provided through the Research & Development Tax Incentive^a (R&DTI), which aims to encourage businesses to undertake R&D that may not be viable for an individual business, but may yield outcomes that have a wider benefit to Australian society (PC 2017a, p. 23). The R&DTI lowers the cost of undertaking R&D and, through a refundable tax offset, alleviates liquidity constraints for cash-constrained start-ups and SMEs. It also provides concessions to improve the asymmetric tax

¹⁵ As discussed in more detail in section 2.4, businesses can also access those skills through collaborating with universities for innovation.

Box 2.3 – Absorptive capacity and the R&D Tax Incentive

treatment of profits and losses and the bias this creates against risk taking in the economy, including R&D (Business Tax Working Group 2011, p. 13).

Previous reviews of the R&DTI, and consultations undertaken for the inquiry, have raised a number of concerns with the program, including limited additionality (Ferris, Finkel and Fraser 2016, p. 14) and the stifling effects of some aspects of the program's administration, including uncertainty about eligibility and the ex-post compliance assessments that may require small firms to retrospectively pay back their offset (ASBFEO 2019, p. 5).

Given the importance of policy certainty and history of tinkering with the R&DTI, additional changes beyond those previously recommended may be unwise. However, given the connection between researchers and absorptive capacity, one option worth considering concerns changes to eligibility criteria. Currently, the program uses a broad concept of eligible expenditure, allowing almost any type of expense that is directly relevant to an eligible R&D activity except interest payments and the purchase of capital assets (Ferris, Finkel and Fraser 2016, p. 12). Focusing eligibility criteria on personnel costs could stimulate additional absorptive capacity by bringing additional researchers into firms. However, prior research suggests an increasing focus on personnel with a limited supply of researchers may just lead to higher wages rather than additional R&D activities, reducing the effectiveness of public support (Ferris, Finkel and Fraser 2016, pp. 12–13). Further work would be required to assess the elasticity of supply of researchers.

a. The R&D Tax Incentive is jointly administered by the Australian Tax Office and AusIndustry.

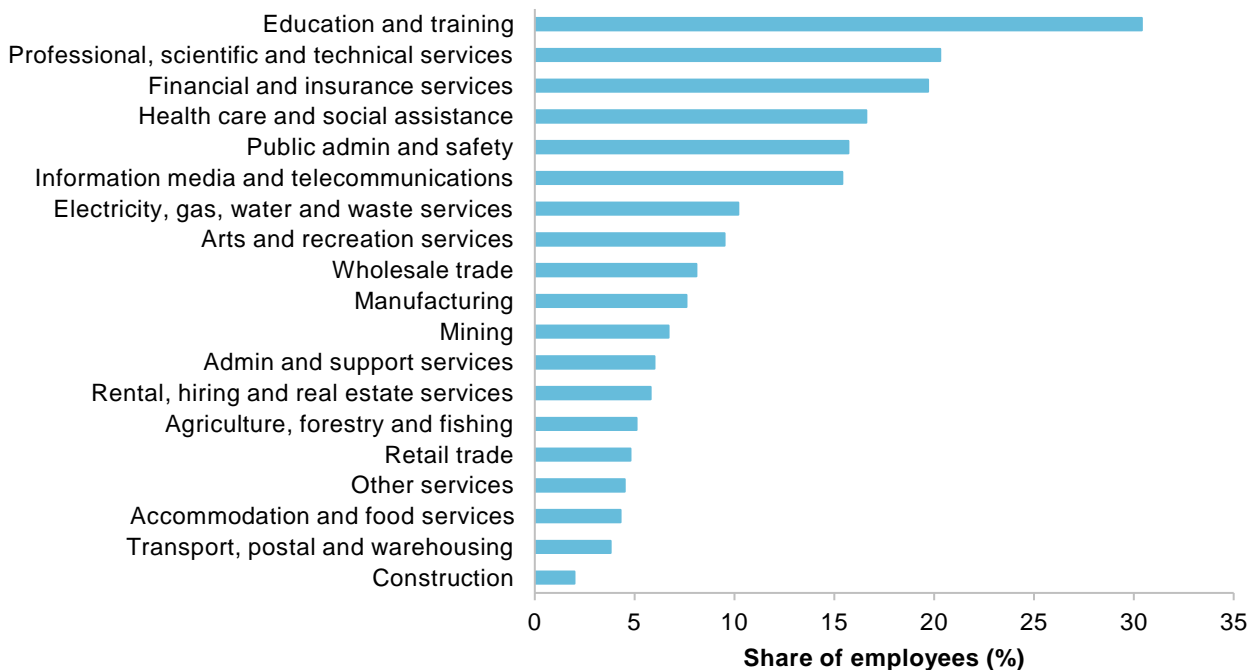
There is substantial scope to increase the industry-readiness of researchers by ensuring that people with postgraduate qualifications are provided with pathways to engage with industry. Some industries already tend to have large numbers of post-graduate educated employees, particularly education, professional services, financial services and health care (figure 2.8). But linkages could be improved by creating more connections between students and industry when they are engaged in study. Data from the Department of Education, Skills and Employment indicate that less than 14% of higher-degree research students engage with end users in some way (DESE 2022a). Although the number of university-industry research collaborations have been increasing (ARC 2018), there is still scope to create more linkages between early career researchers and industry.

To increase the supply of researchers with industry-relevant research experience and increase knowledge commercialisation, the federal government committed \$296 million for the National Industry PhD Program under its University Research Commercialisation Action Plan (DESE 2022d, pp. 89–95). The program will support 1800 PhD candidates and 800 industry fellows to undertake industry-focused research projects over the next 10 years, with preference given to applications aligned with the National Manufacturing Priorities.

Creating researcher training with linkages to industry increases the likelihood that researchers can become employed in industry, which then helps diffusion take place. For example, Monash University's Graduate Research Industry Programs, which establish and facilitate student scholarships for PhD students in particular industries, have had a high success rate linking PhD students to industries such as water sustainability, food and dairy, sustainable public transport, chemicals/plastics/polymers, digital health and behaviour change for sustainability (Monash University, sub. 184, pp. 8–9).

Figure 2.8 – Education, professional and financial services, and health care have large numbers of postgraduate trained workers

People employed with postgraduate education relevant to the job, 2018-19



Source: ABS (*Qualifications and work*, 2018-19 financial year, Cat. no. 4235.0).

However, increasing innovative outcomes and diffusion by better leveraging highly skilled researchers in industry likely requires more than supply-side measures — business demand for and capacity to use researchers’ skills also matters. Moreover, the program may be of insufficient scale to make a significant difference to industry (Howard 2022; IRU 2021, pp. 7–8). Preferencing applications aligned with the National Manufacturing Priorities restricts the range of industries, disciplines and types of research activities and that may benefit from the program — services industries and social sciences researchers, for example, are less likely to participate in the program.



Recommendation 5.2
An industry-agnostic approach to National Industry PhD Program

The Australian Government should actively promote innovation diffusion across a range of industries as part of its role in capability building. By adjusting the National Industry PhD Program so that it is industry ‘agnostic’ and does not preference applications aligned with the National Manufacturing Priorities, the Government could encourage diffusion of new knowledge and best practice into the services and social sciences.

Improving the capabilities of the existing workforce

There is a large market for workforce development and training in Australia, with 23% of Australians aged 15–74 undertaking work-related training¹⁶ in 2020-21 (ABS 2022e). Moreover, supply chain partners, consultants and industry associations offer training to build the capabilities of firms, and in some cases, allow firms to ‘outsource’ certain management skills (box 2.4).

Box 2.4 – Businesses can seek private solutions in the market to build capabilities for innovation

Lifting workforce capabilities does not always require government involvement. In fact, firms are able to access a range of private solutions to build the skills of their workforce and managers, or outsource tasks requiring skills lacked by the firm.

- For larger firms in particular, **consultants** provide an outsourcing opportunity, creating a quick and easy way to bring skills and knowledge into the firm. And smaller firms often source outside expertise (in accounting, for example).
- Local business networks and industry associations provide a range of services — for example, the provision of advice and some consulting services — that are more accessible than consultants to smaller, resource-constrained firms.
- Participating in supply chains provides opportunities for up-skilling through formal training and informal mechanisms, like incidental exposure to better management practices. For example, the Australian Digital and Telecommunications Industry Association (ADTIA) told the Productivity Commission that the digital, smart products and subscription TV and streaming sector requires additional training for local cablers through both enterprise internal training and the VET system because customer expectations of cablers often exceed installation practices to include information about the products themselves (ADTIA, pers. comm. 24 June 2022).

Given the importance of lifting the capabilities of smaller, resource-constrained firms, industry associations play an important capability-building role.

- The Interactive Games & Entertainment Association (IGEA) offers **short courses** on how to run a studio, runs webinars on areas where support is needed (such as in applying for grants and project management skills), and ran an education summit to bring together educators to ensure consistency and that available offerings target the industry’s skill needs.
- Some industry associations, such as the Restaurant and Catering Association and the Australian Retailers Association, deliver nationally recognised training in the VET sector as registered training organisations (RTOs). The Council of Small Business Organisations Australia (COSBOA) suggested that running a RTO was one way that industry associations can better enable diffusion. Partnering with existing RTOs is another common strategy.

If governments invest in building capabilities for innovation outside of the broader education system, they should prioritise policies and programs with the highest expected social return. Given the potential effect on

¹⁶ Work-related training is training which did not form part of a qualification and was undertaken for work purposes.

productivity of improving management capabilities, programs to address skills gaps in the firms that will most benefit from it — namely, SMEs — may be one way to generate a high social return.¹⁷

In this context, many of the Australian and State and Territory government programs that aim to build workforce skills target particular segments of the workforce — such as mature or young workers — or provide services to help small business owners and managers improve the overall performance of their business (box 2.5). Such programs may help to build firms' innovation capabilities if they:

- target skills needed by businesses to effectively adopt and integrate new technologies, such as digital skills
- help improve management skills
- help businesses to identify opportunities to innovate as a way to reduce costs and improve performance.

Box 2.5 – Programs that may help build skills businesses need for innovation

General programs

Various government programs that provide support to upgrade skills and improve business performance may also build the skills and management capabilities needed to successfully identify and adopt innovations.

For example, the Australian Government's **JobTrainer Fund**, which was introduced during the COVID-19 pandemic, provides financial support for job seekers and young people (including school leavers) to upskill or reskill in areas of identified skills (DESE 2022b), whereas the **Skills and Training Incentive Program** assists mature age Australians to update their skills and stay in the workforce (DESE 2022c). To the extent that these programs target skills needed by businesses, they may also support innovation capabilities.

Other programs indirectly support management capability by providing information and services that help businesses to identify opportunities to improve business performance — including through innovation. For example, the ATO's **Small Business Benchmarking** provides free benchmarking for small businesses on industry-relevant performance indicators, including guidance on when a business may have room to improve (ATO 2022).

State Governments also play a role through a variety of programs including advisory and concierge services to small businesses, such as the NSW Government's **Business Concierge** and **Business Connect** programs (Service NSW 2022). In addition, initiatives that encourage small businesses to access specialist advisers and business support services (such as financial, accounting, strategic or management advice) — including the Tasmanian Government's **Small Business Advice and Financial Guidance Program** and the Victorian Government's **Small Business Specialist Advice Pathways Program** — can help these businesses to access the skills they need to adopt innovations (CPA, sub. 106, p. 6).

¹⁷ Submissions to the inquiry recommended that measures be put in place to help SMEs build skills that currently stand as a barrier to adopting and using new technologies, specifically digital and management skills. The Australian Institute of Company Directors argued for “measures to harness the untapped productivity potential of small and medium sized enterprises (SMEs) and NFPs, including support schemes focused on management and digital skills” (AICD, sub. 44, p. 2). The Australian Small Business and Family Enterprise Ombudsman noted that there is a digital skills gap that needs to be filled to underpin economic growth and this is demonstrated by the continued demand for higher-level digital skills in Australia. Training should focus more on generic transferrable skills rather than on skills with specific applications” (ASBFEO, sub. 64, p. 4).

Box 2.5 – Programs that may help build skills businesses need for innovation

Programs focussing on novel approaches and entrepreneurs

Services offered under AusIndustry’s **Entrepreneurs Programme** provide advice and funding for entrepreneurs and businesses to connect with researchers and undertake research projects (Innovation Connections) and to bring a novel product, process or service to market (Accelerating Commercialisation) (Business.gov 2022). The CSIRO also runs a range of programs directed towards entrepreneurs and research teams, such as the **ON programmes**, which include training in customer discovery and market validation activities, as well as an accelerator to help commercialise ideas (CSIRO 2019). State Governments across Australia also offer a variety of grant programs and fund accelerators and start-up hubs, such as the **Victorian Innovation Hub** and **Sydney Startup Hub**, which provide support for collaboration and staff development to help start-ups grow (Department of Jobs, Precincts and Regions and DJPR 2018; Investment NSW 2022).

Some government programs directly target the skills and management capabilities needed for innovation. Like most existing business innovation policies, these programs tend to target businesses engaging in highly novel, new-to-market innovation. Some offer support to connect businesses with research institutions and commercialise novel products and technologies. Evaluations and feedback from inquiry participants suggest that some of these programs, such as the Enterprise Connect program (2008–2014) have had a positive effect on firm performance (Bruno 2020, pp. 12–16). However, their wider impact is likely limited by a lack of program consistency over time. The relatively small number of businesses assisted (relative to the R&D Tax Incentive, for example) (DIIS 2019b, p. 44) and the focus on highly novel innovators may mean that skills imparted are not as relevant or easy to diffuse to other businesses.

Existing workers can also develop management capabilities and other skills relevant for improving diffusion through the broader education and training system, which includes both formal learning resulting in a qualification and other options such as unaccredited short courses. As discussed in this inquiry’s companion volume *From learning to growth*, formal learning options are more commonly undertaken by younger people (including students before they enter the workforce), and government investment tends to focus on the initial post-school, pre-employment period, rather than ongoing training throughout a worker’s lifetime. That volume includes a recommendation that the government could encourage uptake of lifelong learning options by trialling targeted policies for work-related upskilling and reskilling, and extending self-education tax deductions to education that is likely to lead to income outside of current employment. Existing programs designed to support lifelong learning, such as Employability Skills Training and the incoming Skills and Training Boost, should also be evaluated for their effectiveness at facilitating additional training.

2.4 Collaboration and networks can catalyse innovation diffusion

The diffusion of innovation requires channels for collaboration and networks for knowledge transfer. Such linkages are critical to allow information about innovations to spread — to *diffuse* — among businesses. These include:

- within business and business-to-business linkages, such as information flows through supply chains (see section 2.2 for examples relating to international trade)

- business-to-business linkages via an intermediary, such as industry associations and consultants
- research institutions-to-business linkages, such as with universities.

Channels for information and innovation diffusion

Information is critical to the uptake of innovation. Businesses need to know what technologies and practices exist in the market place, their compatibility with the business' organisation and how to adapt and integrate them into their organisation (Hall 2004, p. 19). Sources of information include research organisations (universities and public research institutions); firms in the same or related industries (including foreign firms); and industry organisations and networks. However, not all sources of information will be perceived as equal by firms, with some sources likely to be considered both more trustworthy and relevant to a business' situation (Nooteboom 1994, p. 343).

The business community is the most important channel for diffusing information about innovations

Firms responding to the ABS *Business Characteristics Survey* (figure 2.9) indicated that they derive ideas and information about innovation from a wide range of sources. Interestingly, Australian businesses source most of their ideas for innovation from within their own organisation. Although some of this comes from in-house R&D and on-the-job ingenuity, a large part of this comes about from workers moving between firms and bringing diverse skills and knowledge from their previous workplaces with them. In its 2017 Innovation Benchmark Report, PwC noted that, of the 1222 firms they interviewed, over two thirds agreed that:

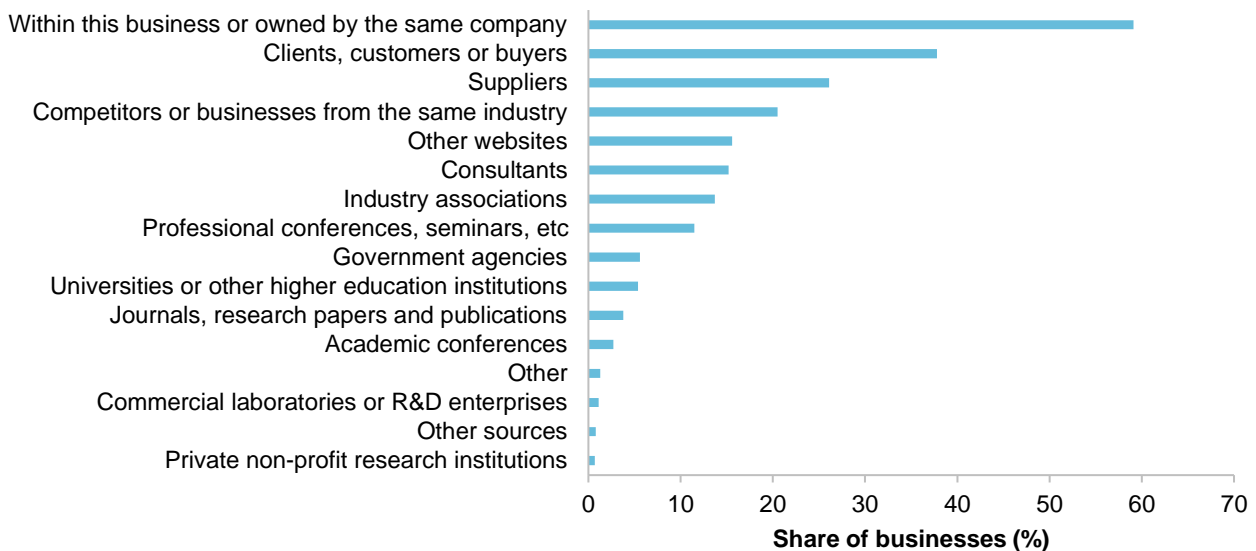
bringing in employees with fresh thinking and establishing innovative behaviours and cultures are the most critical success factors for innovation, well above other criteria, such as increasing the innovation budget or establishing a clear business model for innovation. (Eriksson 2017)

Businesses also learn about innovative ideas and processes from their clients, their competitors and from their suppliers (figure 2.9). Direct interactions with suppliers and clients can be a trusted source of information, particularly where there are strong existing business relationships. Large, efficient firms (such as multinational corporations) even have incentives to actively transfer information up and down their supply chain (section 2.2). Equally, competitors' experience with adopting and using new technologies can be an important source of information about innovation (Stoneman and Diederer 1994, p. 924), when that information can be shared or observed.

Seeing how technologies have performed in other businesses can reduce uncertainty about the potential costs and benefits from adoption, reduce the need for costly experimentation, and play a role in socialising more complex organisational and technological innovations. For example, contactless payment systems have diffused rapidly through the Australian economy because they provide immediate and clear benefits for businesses (AMTA, sub. 163, p. 9), so much so that, although contactless payment technology was invented in the United States, Australian adoption rates of contactless payments by 2016 were 20 times higher than in the United States (NSW PC 2022, p. 47). This is particularly relevant for time and resource-poor small businesses. Participants in consultations for this report emphasised the importance of visibility for successful innovations. The higher uptake of more common foundational technologies, like cloud technology, is partially due to their increased visibility to Australian businesses compared with niche technologies, such as 3D printing (PC 2022a, pp. 10–11).

Figure 2.9 – Innovative ideas mostly come from within businesses or from clients and customers

Sources of ideas or information for innovation, innovation-active^a businesses, 2019–2021



a. Innovation-active firms are firms that reported one or more innovations, or firms with abandoned or ongoing innovation activities related to product or process innovations.

Source: ABS (*Characteristics of Australian Business*, 2020-21 financial year, Cat. No. 8158.0).

Many of these information flows will occur without government intervention. In some industries, spillovers among competitors may be actively promoted, as in agriculture where on-farm demonstrations and farmer networks actively encourage learning from early adopters. This will also be the case in creative industries where mutual support is actively encouraged, such as in the interactive games and entertainment sector:

[the] sector is a very sharing sector — our members are very happy to talk about and share their experiences with other companies. (IGEA, pers. comm., 7 June 2022)

Beyond such mutual support, business associations can facilitate formal collaboration such as joint ventures. Collaboration between firms has been found to improve firms' capacity to innovate (De Propris 2002, p. 350) by connecting businesses with the know-how, capabilities and resources they need to adopt, adapt and successfully integrate innovations into their operations. For example, collaboration has been found to increase the probability that Australian firms will innovate (Soriano and Abello 2015, pp. 349–352) and introduce innovations that are new-to-the-market (Majeed and Breunig 2021, p. 13).

Collaborating also helps to establish networks between businesses, both formal and informal, that facilitate the flow of information and knowledge throughout the Australian economy and from overseas. Collaborations often arise spontaneously, as firms see the mutual benefit of engaging each other. For example, 'young and small Australian companies who may not have a strong business focus can develop project management skills via collaborations with overseas companies' (IGEA, pers. comm., 7 June 2022). However, these collaborations can also be facilitated by public initiatives (such as challenges, contests, hackathons), incubators and accelerators, or publicly funded mechanisms like the Cooperative Research Centres.

Intermediary organisations play an important role in realising spillovers and connecting businesses

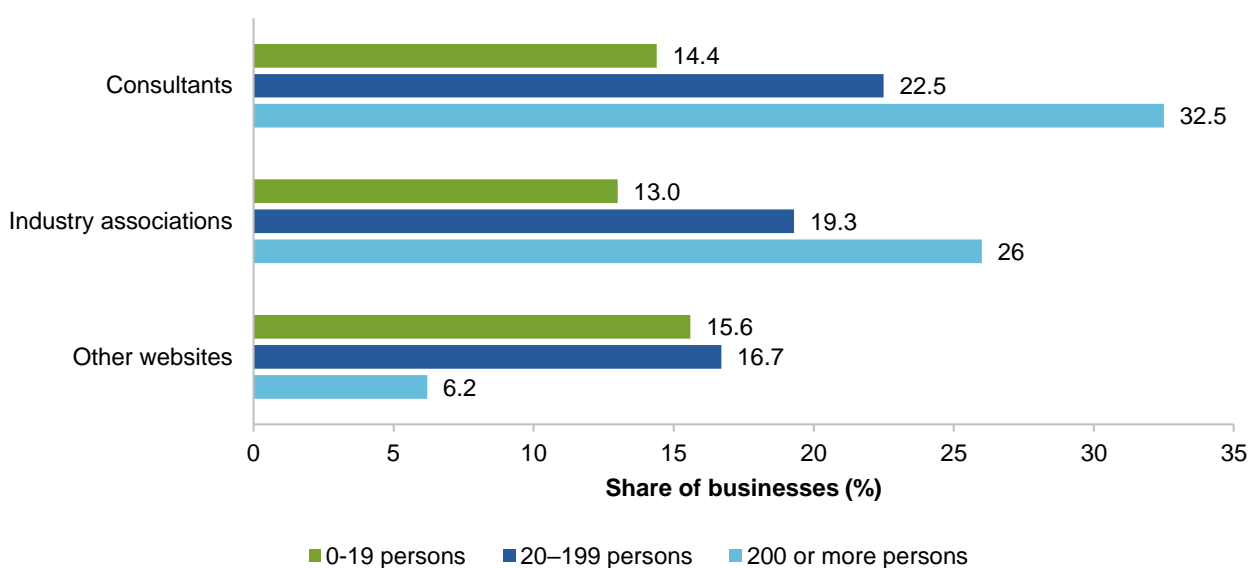
Intermediary organisations can play an important role in helping businesses build capacity for innovation adoption. These can include consultants and business advisers, industry associations or platforms for third party information accessible via web resources. These intermediaries can facilitate early stage innovative development and transformation and can also help firms with commercialisation and diffusion later in the innovation process (Bergek 2020, pp. 379–382).

Businesses rely on different intermediaries depending on firm-specific characteristics, such as firm size. For example, larger firms are more likely than small or medium firms to ‘outsource’ identifying valuable ideas by using consultants (figure 2.10). Smaller firms, on the other hand, are more likely to rely on their own research using open-knowledge sources (websites, journals, research papers or publications) than large firms.

Access to these open-knowledge sources can be challenging for some businesses (and for intermediaries providing advice to businesses such as industry associations, discussed below). For example, many academic journals, research papers and publications are locked behind paywalls that can be expensive to access for businesses and individuals that do not have a subscription, even though the research has often been funded by taxpayers. Restricted access can limit the reach of this research and its use not only for commercialising novel innovations in areas such as medicine and climate technology, but also for disseminating existing innovative practices to small businesses and individuals (Foley 2021). The impacts are felt not only by the business community, but also by government departments developing policy in areas such as education, health and climate change (chapter 3), as the latest evidence on effective practice in these areas is often published in locked research journals.

Figure 2.10 – Larger firms are more likely to ‘outsource’ innovation, while smaller firms rely more on open sources of information

Sources of ideas or information for innovation, innovation-active^a businesses, 2019–21



a. Innovation-active firms are firms that reported one or more innovations, or firms with abandoned or ongoing innovation activities related to product or process innovations.

Source: ABS (*Characteristics of Australian Business*, 2020-21 financial year, Cat. No. 8158.0).

Opening up access to this research could therefore have significant benefits for diffusion and productivity growth. There are alternative models for diffusion of academic research that avoid user charges, including author pays or requirements that publicly-funded research be freely available through open-source arrangements (as is the case for much medical research in the United States). The Productivity Commission's inquiry into intellectual property sets out a model for this reform (PC 2016a). The Australian Academy of Science noted that the United States has already moved to make all federally funded research publicly accessible by 2025 (AAS, sub. 200, p. 2).

In this context, the Chief Scientist has recently proposed an open access model for research distribution in Australia, which would apply to both existing and future government-funded work (Brookes 2022).¹⁸ The model allows publishers to continue to be paid for their functional roles such as managing peer review and editing processes, but would be required to make research freely available online for all Australians, with national agreements covering both the functional publishing costs and nation-wide read access. The government should consider the benefits and costs of this proposed model and other potential approaches in working towards open access to currently-locked research.

Consultants and other business advisers also communicate information about innovations to stakeholders and can help to build absorptive capacity within organisations. For example, accountants can leverage their existing trusted relationships with time-poor businesses (especially small business) to help improve their technology and practices. Recognising this important role, Chartered Accountants Australia and New Zealand has a CA Catalyst program that trains accountants to provide advice to their clients on a range of issues such as digitisation (including cyber security and data analytics) and sustainability (CAANZ 2021), so that these trusted business advisers can be a mechanism for technology and innovation diffusion. COSBOA stressed that improving innovation adoption requires people to get advice from trusted advisers and organisations, noting that 'good adopters [have] good support and connections in the community, good advisers, and are connected to their organisations' (COSBOA, pers. comm., 9 June 2022).

Industry associations also play a very important role. Associations can share technical information with their members. They can host professional conferences, seminars, meetings and trade shows, which are effective at creating networks and facilitating the flow of information between businesses. As the Australian Retailers Association put it when discussing the importance of visibility of new innovations, 'if you don't see it, you can't be inspired by it and want to buy it' (ARA, pers. comm., 6 June 2022). The Interactive Games & Entertainment Association similarly told the Productivity Commission another way they help build awareness of innovation is by running the 'Australian Game Developer Awards', which highlights innovation and excellence in a range of areas including engineering, art and sound design (IGEA, pers. comm., 7 June 2022).

More generally, industry associations can facilitate connections among firms, including leading and laggard firms; young and established firms. Associations can also connect firms to government agencies and support. For example, among its other services, IGEA facilitates connections between firms by performing an introductory role between its members by hosting formal and informal events (IGEA, pers. comm., 7 June 2022). IGEA suggested that some new collaborations and publishing deals came about because social events brought firms to together. The Restaurant and Catering Association indicated that they work with platforms (such as Uber Eats) and technology companies to make adoption easier, providing information to platforms to better help them provide a service to firms in their industry (R&CA, pers. comm., 9 June 2022).

¹⁸ It should be noted that opening access to Australian-funded research would also increase Australian businesses' and government departments' exposure to a larger body of international research on a topic, as the freely available articles would have extensive references to other research. However, these businesses and departments would still not have free access to the underlying international research under such an access model.

Governments' role is limited, but can provide indirect support

Supporting connections with intermediaries

Government has a limited direct role to play as intermediary between businesses. As noted by Nooteboom (1994, p. 343), while government does not usually have a vested interest in a particular innovation — and as such, is regarded as a trustworthy source of information by businesses — government may not be seen as competent to judge the applicability of a given technology or practice for a firm. Moreover, inquiry participants suggested that information that is critical for diffusion — such as on digitalisation and cyber security — is provided by government agencies but can be overly technical and reliant on jargon, limiting its usefulness for small businesses in particular. Intermediaries may help to 'translate' government information.

Nonetheless, government can indirectly support with initiatives that create or invest in industry-connected intermediaries. This may be particularly relevant for diffusing newer technologies and processes that are untested in Australia or in a given industry, where a lack of information about how they perform under local circumstances, or the adaptations needed to suit the local market, may be a barrier adoption and use. While early adopters — both *leaders* and *naïve leaders* — are an important source of information for other firms about the performance of novel innovations, they can incur significant costs in adopting and trialling new technologies. The incentives for secrecy that this creates can mean that other potential adopters must incur the same costs to evaluate and trial the technology, delaying wider adoption. Indeed, several industry associations told the Productivity Commission that more coordinated testing and evaluation of new technologies might enhance diffusion by reducing uncertainty and enhancing spillovers of information that is critical to good decision making about adoption.

It is difficult to make a case that firms who incur the costs of researching, importing, adapting and trialling a new technology should share their experiences with other firms, as this would presumably reduce the payoff and their incentive to innovate in the first place. But if those initial costs are shared — with relevant industry associations, government or other non-commercial entities — then making that information available to other firms could enhance diffusion.

An example of government playing this role is by funding the establishment of Industry Growth Centres (box 2.6). The Growth Centres are positioned as a link between research, industry, government, and global markets, and while their remit does not explicitly include a role in diffusion, some Growth Centres undertake activities in support of innovation diffusion — for example, the Advanced Manufacturing Growth Centre has explicit principles involving researching, demonstrating and promoting awareness of best practices in advanced manufacturing (AMGC 2021). The Growth Centres' established networks and links between research and industry may be better utilised to upskill and diffuse innovation to and between existing businesses, particularly from overseas, rather than focusing on trying to commercialise and scale new-to-the-world innovation.

The future of the Growth Centres is uncertain. The original intention was for the Centres to become financially self-sustaining, but they vary in the strength of their financial positions (Riley 2022). The 2020 evaluation of the initiative observed that some Growth Centres have successfully accessed funding from the private sector and other government programs (such as research funds), but ultimately noted that 'it is unlikely the [Growth Centres] will become self-sustaining. It may be possible that a public/private funding model will provide a transitional platform' (ACIL Allen 2020, pp. vii, ix).

Box 2.6 – Industry Growth Centres

The Industry Growth Centres were established in 2015-16 to support competitiveness in sectors considered to be of competitive strength and strategic priority^a: advanced manufacturing, known as the Advanced Manufacturing Growth Centre (AMGC); cyber security, known as AustCyber; food and agribusiness, known as Food Innovation Australia Ltd (FIAL); medical technologies and pharmaceuticals, known as MTPConnect; mining equipment, technology and services, known METS Ignited; and oil, gas and energy resources, known as National Energy Resources Australia (NERA) (DIIS 2019a).

Each Growth Centre was tasked with four key priorities: increasing collaboration and commercialisation, enhancing management and workforce skills, improving access to international markets and opportunities, and identifying opportunities for regulatory reform (DIIS 2019a). The Centres were intended to focus on areas where industry organisations were yet to develop, as well as to more closely engage with the research sector (Nous Group 2019, p. 7).

An assessment by Nous Group in 2019 suggested each Centre was generally meeting its objectives and business plan. Of their four priorities, the centres were found to have focused the most on increasing collaboration and commercialisation of research (Nous Group 2019, p. 6). An evaluation by ACIL Allen in 2020 found that the Centres have supported Australian industries to become more competitive, and that an industry-led approach is a sound way to deliver long-term value (ACIL Allen 2020, p. vi).

a. Labor proposed a seventh Growth Centre focused on the battery production supply chain during the 2022 election campaign (Riley 2022).

To the extent that Growth Centres continue to operate broadly similarly in the future — by facilitating connections between industry, government, researchers and markets — governments could partner with these networks to reach a wider business audience in specific industries when they implement other programs to support diffusion. For example, programs that build management and other capabilities, and extension services for small businesses (section 2.3), could be marketed or launched through these networks to promote awareness and uptake. These partnership efforts could also extend to governments working with other intermediaries — such as industry associations (discussed above) — which would improve their ability to reach businesses in industries that are not currently supported by a Growth Centre, including a range of service industries.

Facilitating knowledge transfer with extension services

Governments can also facilitate the transfer of technical or industry-specific knowledge on the existence and proper implementation of new technologies, similar to the extension services offered in the agricultural sector.¹⁹ Extension services have been used mainly in agriculture as a way of transferring knowledge and innovations — often developed through publicly funded R&D — to farmers for their practical use.

There is a significant body of evidence suggesting that agricultural extension generates significant positive social returns. For example, based on a meta-analysis of 289 studies on the returns to agricultural R&D and extension in the post-war period, Alston et al. (2000, p. 201) found an overall median rate of return to extension of 63%. In a study focused on the Australian broadacre industry, Sheng et al. (2011, pp. 28, 31) estimated that past public investments in extension generated an average rate of return that could be as high

¹⁹ This was also proposed by Professor Christopher O'Donnell (sub. 40, p. 12).

as 47% a year — contributing about 0.27 percentage points to annual total factor productivity growth in the broadacre industry.

The key policy question is whether variations on this model could work in industries other than agriculture. As noted in chapter 1 of this report, different sectors of the economy innovate in different ways, with implications for the shape of the innovation ecosystem in each case. For example, agriculture is traditionally characterised by significant industry-specific R&D (performed centrally and funded by industry levies or public subsidies), with a fairly stable population of farm businesses who are often not competing with one another on price, quality or volume. In other industries, businesses' needs tend to be more differentiated and there can be more secrecy and competition about innovation.

Outside agriculture, extension services have had more mixed results. For example, the Manufacturing Extension Partnership (MEP) in the United States, which provides extension services to manufacturing SMEs, was not without problems. Econometric evidence indicated that the program has had positive and significant effects on labour productivity and rates of firm survival, particularly for small firms (Lipscomb et al. 2018, p. 41). However, despite the original intent for the program to become self-financing after a six-year period of government support, the program has not managed to become self-sustaining, and continued support for the program in the United States has been contentious (Sargent 2019, pp. 3–4).

Moreover, the specific design of the program is crucial to ensure that the services provided match the needs of businesses. For example, the original design of the MEP, which targeted the transfer of federally funded technologies to SMEs, was found to be misguided — manufacturing SMEs did not need advanced technologies. Rather, their needs were more basic, including off-the-shelf technology and more general management advice (Sargent 2019, p. 4).

Extension services have had more limited applications outside of manufacturing and agriculture. However, some of the practices of industry associations may be considered as examples of extension-like services. For example, the Restaurant and Catering Association told the Productivity Commission that, among other services, they help the businesses that reach out to them to identify challenges and solve problems, including translating and providing information about innovations already available in the market (R&CA, pers. comm., 9 June 2022). More broadly, there are some not-for-profit organisations that provide extension-like services to businesses (sometimes for a fee) as part of their business mentoring programs, including specifically for small businesses (SBMS nd).

Despite the mixed results of extension services outside agriculture, given their success in agriculture, some variation on this theme is worth considering to better enable the diffusion of innovations and avoid the worst aspects of other forms of industry policy. The government should fund a trial of extension services in several other sectors, tailoring the approach depending on what services are relevant for most small businesses in that sector (for example, guidance on adopting commonly available technologies and innovations that are widely available in the market, rather than advanced technologies that may not be useful for many businesses). Early engagement with businesses in the sector will be important to identify the types of services that would be most beneficial.



Recommendation 5.3

Improving collaborative networks and knowledge transfer

Governments could strengthen collaborative networks for diffusion and facilitate knowledge transfer through:

- trialling government-funded extension services, which have so far been focused on the agriculture industry in Australia, to support diffusion of technical knowledge and relevant technologies in other sectors. The initiative should be tailored by sector depending on what services are relevant for most small businesses in that sector, with early engagement between government and businesses to identify the types of services that would be most beneficial
- requiring open access for government funded research in journals, papers and publications that is currently locked behind paywalls. In implementing this change, the government should compare the benefits and costs of the Chief Scientist's proposed open access model with the benefits and costs of other potential approaches
- partnering with intermediaries — such as industry associations and other advisory or network bodies — that have existing connections between industry, government, researchers and markets when implementing programs to support diffusion (such as capability development initiatives and extension services). This would enable governments to reach a wider audience with their diffusion initiatives.

University-industry collaboration

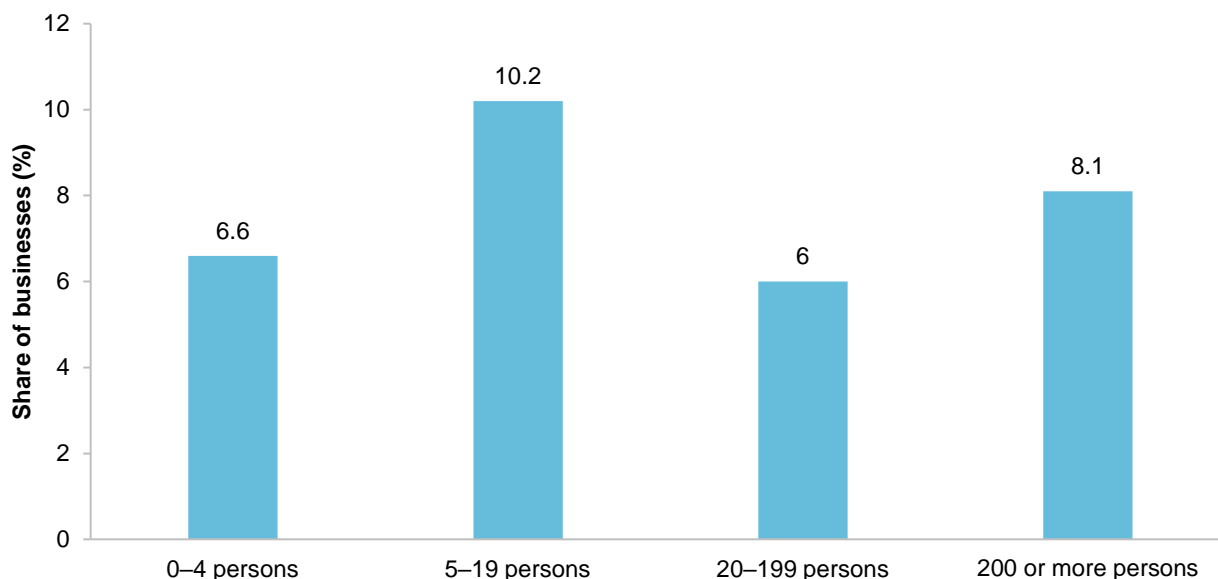
University-industry connections are largely utilised for transferring and commercialising novel innovation. However, linkages with universities can also build absorptive capacity across firms and spread knowledge and skills within and across industries — making the potential for diffusion of innovation higher across the economy. These connections can include:

- joint R&D conducted between businesses and research institutions, like universities (including industry PhDs)
- patent licensing
- the hiring of researchers with graduate training or PhDs who have strong links to universities
- input into course content, for example by professional bodies
- consulting by academics.

There is a widely held view that Australian business collaboration with universities is poor.²⁰ Data from the ABS show that, among all innovating firms, collaboration with universities is highest among small businesses (5–19 employees), though levels of collaboration are relatively low overall (figure 2.11). Similarly, figure 2.9 shows that universities play a very minor role as a source of information and ideas about innovation, relative to other channels of information.

²⁰ This view appears to be largely informed by data drawn from the OECD Innovation Indicators database, a compendium of statistics about the innovation activities and outcomes of firms across OECD member countries (OECD 2022b). However, caution is needed in using these indicators because: i) Australia's reference period is one year (e.g. the ABS *Business Characteristics Survey 2018-19* in the most recent update) whereas, for the other countries in the survey, the reference period is two or three years; ii) the data for Australia only covers firms with 10+ employees, and only covers a subset of industries, to be consistent with the Eurostat Community Innovation Survey (CIS-2018) (see notes in OECD 2022b).

Figure 2.11 – Small firms collaborate with universities relatively more than larger firms^a
Collaboration for innovation with Australian universities or other higher education institutions, 2019–21



a. As a share of innovation-active firms

Source: ABS (*Characteristics of Australian Business*, 2020-21 financial year, Cat. no. 8158.0).

Strengthening industry connections with universities should look beyond direct commercialisation

Low levels of engagement between firms and universities may reflect the relatively less common, new-to-the-world research and innovation that is typically done in collaboration with universities (and with other government and private not-for-profit research institutions).

However, it may also reflect a narrow view of the ways that firms can leverage university expertise and research — one that treats university knowledge transfer as synonymous with research *commercialisation*. For example, the recent University Research Commercialisation Action Plan (the Action Plan) (DESE 2022d) highlighted some barriers to university knowledge transfer. However, measures introduced in the Action Plan are designed to increase university research commercialisation by addressing (primarily) university and researcher disincentives and barriers to university-industry collaboration, focused on advanced manufacturing.

In fact, the channels for knowledge transfer are considerably broader, including not just commercialisation activities, such as IP licensing and academic spin-offs, but also knowledge transfer through labour mobility and consulting, as well as spillovers from conferences and networking (OECD 2019b, p. 32). The importance of these channels can differ across fields of research, types of institutions and sectors, as certain kinds of research and types of knowledge are better suited to specific transfer activities (Hughes et al. 2021, pp. 25–36). Moreover, being overly focussed on measures that only capture a single channel of knowledge transfer may miss other types of knowledge transfer and can fail to support the relative strengths of different institutions. For example, regional and technical universities report valuing their ongoing relationships with firms and industries as a pathway for students, joint research and collaboration over more traditional commercialisation activities.

There is considerable scope to strengthen connections between businesses and universities. As discussed in section 2.3, clearer pathways into industry for early-career researchers holds considerable potential. But mid- and late-career academics could also be a valuable channel for the diffusion of innovation, if

appropriate linkages between industry and them can be created. One possible channel is academic consulting with private industry (and government), although complex approval processes and procedures may reduce the incentives for academics to seek out opportunities for consulting (box 2.7).

Box 2.7 – Barriers to academic consulting

Academic consulting is a channel for universities to engage with and transfer knowledge to industry and governments, and to transfer insights from social science research in particular (OECD 2019b, p. 62).

However, consultancy procedures and approval processes may increase transaction costs associated with consultancies and reduce the incentives of academics to engage in them. This may arise as a result of a preference for consultancies to be provided through the university rather than privately by academics.^a Conducting consultancies through the university has advantages. For example, staff may be covered by the university's professional indemnity insurance policies (for example, Monash University 2022); be able to use their professional title and university position; and use the university's facilities and resources. However, the involvement of a university contracting office or legal teams may lead to time delays (Verreynne, Torres de Oliverira and Mention 2021, p. 11). Further, academics who consult through the university may receive only a small share of the consulting fees, and may be restricted to using their share of fees on their academic research expenses, which could also reduce their incentives to seek out consulting opportunities.

Academics and firms may prefer to contract directly for consultancy or advisory services. Universities generally allow academics to engage in private consulting (also referred to as paid outside work) for up to 52 days in a year or 20% of their time.^b However, associated conditions and procedures — which are intended to ensure that academic staff fulfil their obligations to the university and limit any risk to the university — may reduce academics' incentives to pursue private consultancies as a knowledge transfer channel through:

- approval processes, such as requiring approval above the level of the Head of Unit. For example, Monash University requires that paid outside work be approved by the Sub-Faculty Dean or Head of School/Institute (MNHS), Dean or Executive Director (or delegate) (Monash University 2022)
- prohibitions on using university titles or positions. For example, the University of Western Australia's Consultancy Policy prohibits private consultancies from making use of a University position or professorial title (UWA 2021); the University of Queensland (UQ) prohibits academics from using their position or association with UQ as the basis for obtaining 'secondary work' (incl. independent contracting and consulting) (University of Queensland nd)
- conditions for using university resources (e.g. the requirement to obtain permission and reimburse the university for using resources).

a. As an example, UQ's Consultancy, Secondary Employment and Internal Work Policy indicates that it is the University's preference that any non-research work be conducted through UQ as consultancy rather than as secondary employment (University of Queensland nd). **b.** The University of Melbourne specifies 13 days in a quarter, where the dean, or Vice-Chancellor in the case of a dean, can approve an arrangement where the days are averaged over two quarters (University of Melbourne nd). Neither the University of Queensland nor Monash University appear to specify how much time can be used for private consulting.

Individual universities have the right to set their own approaches to academic consulting based on their operational needs and risk management processes. However, unnecessarily burdensome administrative requirements create disincentives for academics to undertake consulting and reduce the potential for knowledge transfer from universities to industry and government. If universities are unable or unwilling to

lower these barriers to academic consulting, the government could help to foster more activity, such as by setting guiding principles to govern universities' approaches to academic consulting and standardised processes and fee requirements. This could be an area that is incorporated into the Australian Universities Accord that the Australian Government has committed to establishing, noting that the panel currently providing advice to the government on the Accord has been directed to examine opportunities to boost collaboration between universities and industry in order to share new knowledge, innovation and capability.



Finding 5.5

An overly narrow focus on university research commercialisation

Recent policy initiatives to increase knowledge transfer are too narrow in their scope in that they focus on direct commercialisation activities and advanced manufacturing industries. By focusing on research commercialisation, policy initiatives to increase knowledge transfer treat knowledge transfer as synonymous with commercialisation, even though other channels — such as consulting by academics — may be more relevant for certain types of firms and industries (especially service industries), research areas (especially social sciences) and research institutions.



Finding 5.6

Administrative constraints can act as barriers to academic consulting

Although university academics are generally allowed to provide consulting services to industry and government, university procedures and approval processes can reduce incentives for academics to pursue such work. For example, requiring the involvement of a university contracting office may lead to delays. Or requirements about how consulting revenue is distributed and obligations to limit risk to the university may also create barriers. These disincentives create a missed opportunity for a valuable knowledge transfer channel.



Recommendation 5.4

Reducing administrative barriers to academic consulting

The Australian Government should reserve the right to facilitate more consulting by university academics, should universities be unable or unwilling to lower unnecessary administrative barriers that disincentivise academics from undertaking consulting. This could be incorporated into the Australian Universities Accord, with the government setting guiding principles to govern universities' approaches to academic consulting and standardised processes and fee requirements.

Other opportunities to foster spillovers and information flows

Benchmarking can highlight opportunities for innovation where businesses are under-performing relative to their peers

Perceiving a need — or equally an opportunity — to improve business performance can lead firms to seek out and adopt productivity-enhancing technologies and practices. Yet as discussed in chapter 1, most

Australian businesses undertake little or no assessment of their own performance, with innovation measures receiving the least attention (figure 1.3). One explanation may be a lack of time. Managers who are time and resource poor may not have the capacity to assess the performance of their business. As noted by the Australian Institute of Company Directors (AICD):

Feedback from AICD members, for instance during consultation on cyber reforms, is consistent that due to resourcing and time constraints many SMEs and NFPs struggle adapting to digital technology changes and building management capability. (AICD, sub. 44, p. 9)

However, a lack of information and effective performance measurement tools may also be a factor. Benchmarking tools can help businesses to identify areas of under-performance by allowing them to compare their performance with similar businesses across a set of relevant performance indicators.

A range of business benchmarking initiatives exist in Australia, offered by government agencies, as well as for-profit businesses or industry bodies to benefit their customers and members (box 2.8). In general, government-provided services have not been developed primarily for the purpose of providing benchmarking tools for businesses. Rather, they have been developed either to provide value back to businesses that supply data required by that government agency (for example, where businesses respond to surveys conducted by the ABS and the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)), or as a complement to other activities undertaken by the agency (for example, benchmarks developed by the ATO for monitoring compliance can also be used by businesses to assess their performance). While some consideration has been given about how this information can be used to provide tailored insights back to businesses, there is currently limited analysis of the underlying drivers, actionable advice, or connection to other services that could assist businesses.

In contrast, services developed by private providers and industry associations tend to be more directly targeted at providing benchmarking services to businesses. The services differ in the detail they provide to businesses, and in particular, the degree to which the information is tailored and actionable for an individual business, with private services tending to offer the most tailored and actionable advice (for a fee).

Box 2.8 – Existing benchmarking initiatives

The Australian Government provides several benchmarking initiatives. These include:

- small business industry benchmarks published online by the ATO (2022), which provide ranges for general performance indicators based on tax return data, tailored to an extensive range of highly disaggregated industries (although not tailored to individual businesses that access the service)
- an initiative currently being developed by the ABS, which will provide tailored benchmarking reports to small-to-medium businesses when they participate in relevant ABS surveys and report their data through a new streamlined reporting application linked to their existing accounting software (ABS 2022a)
- some government agencies that may also provide data at a sufficient level of granularity to enable benchmarking — for example, ABARES provides a variety of agricultural indicators by farm size and type through its Farm Data Portal that can be used by farmers to benchmark their performance (ABARES 2022).

In addition, several for-profit providers offer benchmarking services to Australian businesses (Benchmarking.com.au 2021; FMRC nd; GE Digital 2022) and some industry bodies also offer similar services for their members — for instance:

Box 2.8 – Existing benchmarking initiatives

- Dairy Australia has developed the Dairy Farm Monitor Project, which provides comparative data to dairy farmers through an online portal (Dairy Australia 2022)
- the Innovative Manufacturing Cooperative Research Centre created the benchmarking and diagnostic tool ‘futuremap’ for small and medium enterprises in the manufacturing industry to map their capabilities in 13 areas of industrial competitiveness, including market positioning, leadership and digitalisation (Ai Group, sub. 179, p. 17). The tool provides a self assessment and then identifies tailored opportunities for immediate and medium-term growth opportunities
- Business Excellence Australia has created the Australian Business Excellence Framework that ‘focuses on an organisation’s ability to sustain innovation and provides organisations with guidance on establishing innovation systems’ (BEA, sub. 159., p. 5), which could be used as a framework for performance benchmarking.

How can benchmarking initiatives better support innovation diffusion?

There are three key considerations for developing effective benchmarking tools that encourage innovation diffusion — obtaining access to data, encouraging businesses to use the tools that are developed, and ensuring the tools offer meaningful insights and assistance that promote innovation.

Regarding access to data, improving data sharing arrangements across agencies and increasing the collection of data from government funded entities (for more detail see PC 2022a, p. 43) could increase the usefulness of data for benchmarking purposes. However, this would need to be balanced against the need for data security and maintaining confidentiality for individual businesses. The inquiry’s companion volume *Australia’s data and digital dividend* notes that the ABS and ATO are continuing to explore how they can provide data collected from businesses back to businesses, safely and securely, in order to add value (such as for performance comparison purposes via tailored reports). Other government agencies may also collect and hold data from businesses and consumers that could be aggregated and/or analysed and then provided back to businesses and consumers for benchmarking purposes, including in specific sectors such as ABARES is already doing for farm performance benchmarking (box 2.8). Further sector-specific opportunities for data sharing for benchmarking purposes could include APRA and ASIC data for financial services and ACCC data for various consumer products.

Benchmarking examples from the United Kingdom, Canada, and New Zealand demonstrate the potential to make benchmarking tools directly accessible online, including the ability to tailor the results based on some basic inputs provided by a business.²¹ Efforts by Australian government agencies to provide data back to businesses for benchmarking purposes could be extended by creating similar accessible and tailored tools. The ABS initiative also highlights how existing points of contact between government and businesses can be leveraged to offer benchmarking tools with benefits for both parties. In this case, businesses are offered access to benchmarking, which also acts as an incentive for them to engage with government in other ways (in the ABS example, benchmarking reports will be provided as a direct benefit to businesses that use the new streamlined reporting application).

²¹ For example, the UK Office for National Statistics’ online labour productivity calculator and benchmarking tool (Office for National Statistics 2022); the Business Development Bank of Canada’s productivity benchmarking tool (Office for National Statistics 2022); Stats NZ’s business performance benchmarker (Stats NZ 2022).

The tools that are developed should offer meaningful insights and assistance to the businesses that access them, and specifically promote innovation. The Australian Academy of Technological Sciences and Engineering has noted that traditional indicators of innovation have become ‘increasingly insufficient and misleading’ (ATSE, sub. 98, pp. 2–3). The effectiveness of the tools may be improved by accompanying the benchmarking results with other analysis — for example, accessible and relevant case studies about how similar businesses have succeeded in adopting new technologies and processes could assist innovation-ready businesses that are unsure of where to begin with improving their own operations (Ai Group, sub. 179, pp. 16–17). Advice that highlights the possible underlying drivers of the benchmarking results and provides relevant actions for businesses could also help, and benchmarking services could link to other government programs and support for businesses.

One question, however, is whether businesses would recognise government as a competent provider of such advice (Nootboom 1994, p. 343). This may suggest a need to involve third parties with more direct industry expertise, such as industry associations or business advisers. For example, the Ai Group noted that ‘the development of case study material could also be an area for partnership with industry associations who are more familiar with the target market and less likely to be restrained by political considerations and objectives than government agencies’ (Ai Group, sub. 179, p. 17).



Recommendation 5.5

Using government-held data for benchmarking purposes

Government agencies should use data they collect to help businesses benchmark their performance and provide insights that promote diffusion of best practice.

- Existing efforts to provide data collected from businesses back to businesses for performance comparison purposes, such as those by the ABS, ATO and ABARES, should be extended — for example, by making benchmarking tools with tailored results accessible online, or by accompanying benchmarking results with other analysis such as case studies on best practice.
- Other opportunities to use government-held data for benchmarking should be explored, including in specific sectors where applicable (for example, APRA and ASIC data for financial services and ACCC data for various consumer products).

Firms learn from their neighbours, but place-based programs are unlikely to yield a large diffusion dividend

A recent trend in innovation policy in Australia is an increased focus on place-based programs (ISA 2016, p. 82). Place-based innovation programs — measures to develop or enhance existing accelerators, incubators, clusters and technology parks and precincts (ISA 2016, p. 82) — can create additional opportunities for spillovers between participating firms — often firms operating at or close to the technological frontier. For example, proximity of research institutions to each other can create ecosystems where horizontal spillovers in the form of knowledge, skills and shared infrastructure can attract further investment and improve the diffusion of innovation.

Various Australian governments are already investing in co-location, for example in the Melbourne Biomedical Precinct (Invest Victoria 2022) and Sydney’s Tech Central, which aims to stimulate technology uptake (NSW PC 2022, pp. 58–59). Indeed, place-based programs are one of the key mechanisms for State and Territory Governments to facilitate information flows in the innovation system and encourage

spillovers (ISA 2016, pp. 23–24).²² Place-based policies also play a role in regional development policy (PC 2017e, pp. 70–71).

For firms, the two key benefits of clustering are spillovers from job transitions and knowledge sharing. Job transitions within local clusters create a channel for diffusion, with employees carrying knowledge with them as they move between firms (Krugman 1991). Clustering may also promote collaboration and informal knowledge sharing, particularly when local firms are technologically close (Matray 2021, p. 396).

While there is empirical evidence of knowledge spillovers between co-located firms (for example, Matray 2021, pp. 405–409), empirical evidence on the effectiveness of cluster *policies* is less decisive. One meta-analysis of studies on accelerators and incubators found positive impacts on employment and access to finance (Madaleno et al. 2022, p. 290). Australian studies have found that clustering had a positive and significant effect on R&D expenditure amongst clustered firms, driven largely by increased competition (Bakhtiari and Breunig 2018). However, other scholars suggest the evidence is ambiguous (Bloom, Van Reenen and Williams 2019, p. 178).

Given that spillovers from place-based programs are localised to participating firms, declining rapidly with distance (Matray 2021, p. 403), and highly novel innovators are only a small fraction of Australian firms, these policies on their own may not yield a significant and wide-reaching diffusion dividend. Additional mechanisms may be required to expand the reach of information and expertise developed in a cluster. For example, collaboration with industry associations could facilitate broader knowledge transfer, as discussed above.



Finding 5.7

Policies to promote clusters have a limited impact on broader knowledge transfer

Clustering may promote innovation diffusion amongst participating firms through job transitions and knowledge sharing. But given that spillovers from co-location are highly localised, and most place-based programs focus on highly novel innovators, place-based innovation policies are unlikely to yield a significant and wide-reaching diffusion dividend.

²² See DIIS (2018) for a list of place-based programs around Australia.

3. Innovation and diffusion in government services

Key points

- ✳ **Given governments' spending of about \$880 billion — or more than 42% of GDP — even small gains from innovation and adoption can realise either better services or cost savings of billions.**
- ✳ **Innovative approaches in service delivery, policy and system design are evident throughout the public sector, and extend to regulation, tax and funding settings that also produce benefits for the private sector.**
 - But innovation is often slow, piecemeal, disorganised, and inconsistent across jurisdictions.
 - Benchmarking shows wide variations in the efficient provision of services across jurisdictions.
 - This reflects unique aspects of the public sector: measures of success are contested and ambiguous; funding models create opposing and perverse incentives; norms and regulations discourage innovative approaches; and competitive pressures and the threat of exit are absent.
- ✳ **Many of the approaches to achieving diffusion of new processes and approaches in government services are well-known but underexploited.**
 - Improved funding and procurement models could drive better quality care in health services, and increase the efficacy of government procurement in defence and public infrastructure. Potential improvements include applying more evidence, rigour and transparency to public investment (including via better use of cost-benefit analysis); and adopting longer-term, co-operative and citizen-centred approaches to funding service delivery.
 - Better data collection and program evaluation for government service delivery can uncover why there are differences in performance and how, when not justified, these differences can be narrowed.
 - Innovation could be more efficiently disseminated across government agencies and service providers by strengthening the role of existing diffusion bodies, like the Australian Education Research Organisation or the CSIRO, helping to eliminate practices no longer underpinned by adequate evidence.
 - Government can support greater use of regulatory technology ('regtech') by providing regulation in forms that lend themselves to regtech solutions (such as machine-interpretable regulation) and working with software companies to encourage the provision of compliant regtech solutions.
 - Facilitating access to existing knowledge by government-operated or funded service providers would support the diffusion of best practice. This includes eliminating the pricing of Australian standards that have high public good value, and reforming fair use provisions in intellectual property.

Like market goods and services, public sector innovation and its diffusion increases productivity by either raising output per unit of input at unchanged quality (for example, through improved procurement of defence equipment) or by improving quality and community wellbeing (such as better-quality aged care or more effective health care technologies).²³ While there are fiscal benefits for government from some forms of innovation and diffusion, an increase in the 'bang for a buck' of government spending does not necessarily generate savings: as service quality rises, so too does demand.²⁴

All levels of government are direct providers of non-market services or, through contractual arrangements, the key agents for managing their provision by the private and not-for-profit sector. This includes services provided by local government (such as libraries and waste management), State and Territory Governments (such as health care, schools and public transport, the justice system, and emergency services) and the Australian Government (defence, higher education, and much of the tax and transfer system). As many non-government organisations supply services on behalf of governments, innovations in the way in which governments fund and regulate such organisations are particularly important.

The scale of government-funded and managed services is huge, and so the gains from even modest innovations and their wider diffusion can be large. In 2020-21, total general gross government expenses amounted to about \$880 billion at the local, state and territory and Australian level, or about 42% of gross domestic product (ABS 2021a, 2022b). The biggest potential savings would arise from efficiencies in the delivery of government services to the community (whose value was \$445 billion or 22% of GDP²⁵).

This is a static picture of the role of governments. The expenditure per capita of government services will increase over time — particularly in areas like health and aged care, which are affected by population ageing and rising expectations about the quality of services as incomes rise (Commonwealth of Australia 2021). As emphasised in this inquiry's companion volume *Keys to growth*, just like services in general, further cost pressures will reflect that wage growth in government services will be strongly affected by the necessity to match the wages in higher productivity sectors (Baumol's 'cost disease'). Wages are a key component of government-funded services like age and disability care.

Public sector innovation and its diffusion have always been important, albeit downplayed in public policy. Notably, the Ferris performance review of Australia's innovation, science and research system acknowledged its importance, but it hardly figured in its policy analysis or recommendations (ISA 2016).

²³ As in private businesses, innovation relies on data, research and experimentation, acquired expertise and absorption of ideas from businesses and other governments (domestic and global). However, the measurement of public sector innovation and diffusion is much worse than for the private sector. The enumerated value of innovation — \$2.3 billion spent by the Australian Government and the \$1.3 billion spent by state and territory governments — solely relates to R&D, which is at the novel end of the innovation spectrum (ABS 2022d). Yet there are many activities where resources are spent on innovation, adoption and diffusion of the kind set out throughout this chapter that will be rarely captured by such metrics.

²⁴ An illustration is the growth of PBS-funded intravitreal therapeutic drugs for age-related macular degeneration (AMD), Ranibizumab and Aflibercept. Both treatments are more effective than alternatives, and led to a nearly ten-fold decrease in the incidence of age-standardised blindness due to AMD (Heath Jeffery et al. 2021) — a large quality improvement. Consequently, their use grew massively (zero scripts in 2006-07 to 530 000 in 2020-21), and notwithstanding a price reduction of about 40% from introduction, government expenditure rose by about 14% per annum from 2007-08 to 2020-21 to a total of nearly \$640 million.

²⁵ The spending areas (before non-tax revenue) included are defence; public order and safety; environmental protection; housing and community amenities; healthcare; recreation, culture and religion; education, and transport. The residual expenses of government include some important services, such as R&D on general public services undertaken by governments, but the data to isolate the costs of such residual services are not available.

Yet the need for innovation and its effective diffusion will grow over the next 50 years in managing climate change, the growing burden of chronic disease, and population ageing, among many other issues. A need for effective innovation and its adoption and adaptation across different communities is central to the ambitions of Aboriginal and Torres Strait Islander people and Australian governments to close the gap. The greater the level of innovation and the more rapidly good ideas in any given area of government service provision can be diffused, the more productive and effective will government be in these vital areas.



Finding 5.8
Small changes — large gains

Australian, state and territory, and local governments spend hundreds of billions of dollars each year, mostly on government services. The scale of governments' activities means that even the smallest of reforms — if widely adopted — can generate large savings or improve the quality of services for millions of people.

3.1 Public sector innovation and diffusion occurs, but is variable

Innovative approaches to government services and their delivery, policy and system design are evident throughout government services, often in relation to service processes, but also in relation to regulation, tax and funding settings. Many of these have previously been examined by the Productivity Commission, such as innovative healthcare models for treating chronic conditions that have improved quality of care and led to cost reductions (PC 2021b), and alternative practices in the justice system that have achieved better outcomes at lower costs without jeopardising community safety (PC 2021a). Rapid changes to the delivery of some government services during the COVID-19 pandemic also demonstrated the potential for significant innovation. For example, while many are familiar with the expansion of MBS-funded telehealth in general practice associated with COVID-19, there was also rapid innovation in acute care over this period (Australian Commission for Safety and Quality in Health Care, sub. 9, p. 5).²⁶

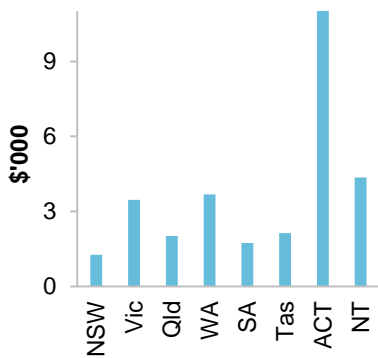
But the history of government initiatives is often typified by the gradual adoption of good ideas — for example, in 1993, Victoria adopted activity-based funding as the way to more efficiently fund public hospitals. It took 17 years before all of the large jurisdictions followed in adopting this innovation (Duckett 2018a, p. 355). This can contribute to variations in the performance of the basic functions of government, as revealed by the Productivity Commission's regular Report on Government Services (with figure 3.1 showing

²⁶ For instance, in 7 months during 2020, the Royal Prince Alfred Virtual Hospital grew its workforce from six nurses to a multidisciplinary service of over 50 medical, nursing and allied health teams. Patient use increased from 1000 to 7000 between May 2020 and January 2021 (Hutchings 2021). An economic evaluation suggested net savings of \$13–18 million from avoided costs associated with standard care models in less than a year of operation (Shaw and Wilson 2021). And as another example, at the peak of the COVID-19 pandemic, Melbourne's Royal Children's Hospital was delivering 70% of its specialist clinic appointments by telehealth. It provided 11 200 telehealth consultations in April 2020 (up from 231 in April 2019). Average transport cost savings were \$85 per consultation per family, while cost savings in caregiver time averaged \$145 (Hiscock et al. 2021). Savings were significantly higher for families in regional or remote areas. While some types of consultations may have reduced accuracy of diagnosis or quality of communication with the family, for many families and many types of specialist appointments there would be little loss of quality, and in many cases the alternative would have been no consultation.

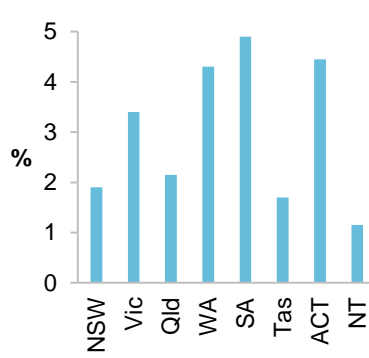
a diverse variety of metrics). These variations may sometimes reflect different circumstances or funding priorities, but many of them suggest that some jurisdictions are better at managing aspects of their services than others, which offers the scope for governments to increase the diffusion and adoption of better practice across public sector services. Notably, variations can sometimes be small — as in patient satisfaction with ambulance services — while others, like the cost of coroner’s courts, show extraordinary differences. The variations within jurisdictions will be much greater than those shown here, so the chart will underestimate the scope for the diffusion of best practice.

Figure 3.1 – Performance in public services often vary markedly even across jurisdictions^a

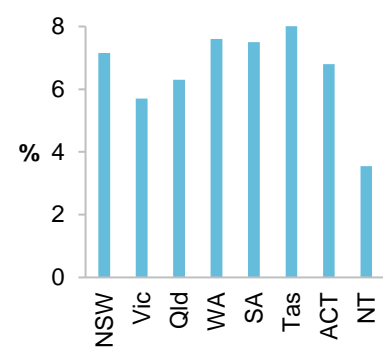
Real net recurrent expenditure per finalisation, coroner’s court, 2020-21



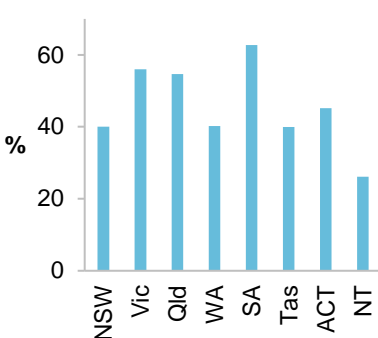
Proportion of public housing unoccupied at 30 June, average of 2018 and 2019



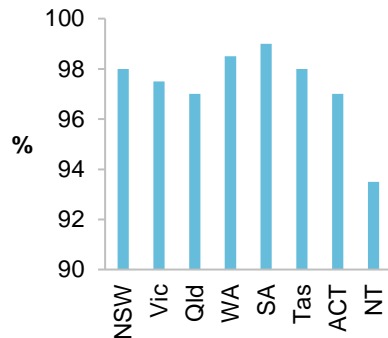
Adverse events per 100 public hospital separations, average of 2017-18 and 2018-19



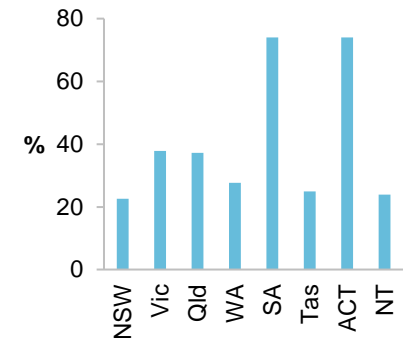
Closed (after exit) support periods for people experiencing homelessness with an individual case management plan where all goals were achieved, average 2017-18 and 2018-19



Patient experience of ambulances – share very satisfied/ satisfied, average 2017-18 and 2018-19



Prisoner education and training % of eligible prisoners, average 2017-18 and 2018-19



a. Pre-Covid-19 values were used where measures were affected by COVID-19.

Source: Productivity Commission (various issues), *Report on Government Services*.



Finding 5.9

Government innovation is not an oxymoron, but governments are slow adopters of best practice

Government at all levels can be highly innovative, as illustrated by initiatives in various services such as healthcare and the justice system, and rapid responses to the COVID-19 pandemic. In combination, these initiatives have the potential to improve resource allocation and deliver better quality services. But innovation and the uptake of best practice is often sluggish, patchy and inconsistent across jurisdictions. Benchmarking of governments' performance across multiple dimensions — such as patient experiences in hospitals and ambulances, prisoner education, support services for people experiencing homelessness — suggests many have failed to draw on the practices of better performers.

3.2 There are major obstacles to innovation and diffusion that need to be reformed or managed

Some obstacles are common to the public and private sector

The challenges for innovation and diffusion in the public sector share some features with the private sector.

Analogous to the business profile of Australia, which is characterised by many small firms, there are **many relatively small providers** or organisations that deliver government-funded services. These include GPs, schools, jobactive providers, aged care home support services, community centres, libraries and a host of other services that are geographically dispersed and therefore necessarily small or medium in size.

Even large organisations like hospitals, transport authorities, aged care facilities, universities, and prisons are spread across both urban and regional areas and have varying levels of government control and oversight.

This means that there are **large potential gains from experimentation and the sharing of successes and failures**. An example of these gains being realised more widely with the diffusion of improved practices can be seen in emergency services, with many people calling ambulances able to have their health needs met in other ways. Early research by the Australian Institute of Health Innovation found referral of low-acuity triple zero callers away from ambulances to alternative care arrangements lowered costs considerably with no adverse health impacts (Vecellio, Raban and Westbrook 2012). Such ambulance secondary triage care has now been adopted in all Australian jurisdictions, with proven beneficial outcomes (Eastwood et al. 2015).

However, **communication across small providers is difficult** as there is often a lack of visibility or forum for such discussions, no coordinating mechanism, and a lack of incentives to share past experiences. It can make diffusion and scaling of innovations more difficult (Albury 2005).

This is accentuated when ownership varies across government-funded services, with, for example, residential aged care provided by governments directly, by not-for-profit agencies and by private for-profit businesses. While ownership can affect the incentives to diffuse innovation, their **different cultures and practices can also hinder diffusion** (in the same way that cultures differ between family businesses, SMEs and large private sector corporations).

The highly decentralised nature of many government services is only one aspect that affects the capacity for adoption. Some government services are more akin to large (a state transport authority) or franchised businesses (Centrelink offices). In these activities, there is the potential for speedier diffusion of innovation

as their governance arrangements allow the head of the agency to *require* the adoption of a new approach. On the other hand, **large entities have big bureaucracies, and tend to be slow-moving**, hierarchical and risk averse, which is inimical to some types of innovation and adoption.

In addition, **slow diffusion may reflect the complexity of some innovations in services**: as noted in chapter 1, the gradual diffusion of innovative processes can be justified by the uncertain and contingent nature of their benefits. For example, coordinated care trials in healthcare — which aimed to get better outcomes for patients through a coordinated package of services — commenced in the late 1990s. The model had strong conceptual underpinnings, but results were varied. A succession of new trials of integrated care took place over the next 25 years, most recently in the large-scale trial of Health Care Homes (HCHs) — a model of integrated care that had proved successful in achieving better clinical outcomes and patient experiences in the United States (PC 2017b, p. 111). However, the evaluation of HCHs found that short-run clinical outcomes were no better than those of patients not enrolled in them (Pearse et al. 2022).

In part, the lacklustre results reflected the **problem of scaling up** a promising approach to large populations, and possibly the short period over which clinical assessments were made:

A key issue for the HCH trial was that changes practices implemented during the trial lacked fidelity to the original aspirations for HCH as articulated by the PHCAG [Primary Health Care Advisory Group]. That is, while some practices introduced comprehensive changes to chronic disease management, others made few changes. Lack of change was mostly due to low levels of patient enrolment and/or relatively low levels of GP participation in HCH, resulting in insufficient scale to allow meaningful changes to be made. (ibid, p. 22)

Another example of difficulties scaling up effective practices can be found in mental healthcare. In 2017-18, about 40 000 consumers in community ambulatory mental healthcare services would have benefitted from participation in an Individual Placement and Support Program, yet only 4.5% of that group did so (PC 2020e, p. 949). This was despite firmly established evidence in favour of this approach, though it may be partly driven by the cost of treatment. The broader picture of Australia's mental healthcare system was that adoption of a best practice system would yield benefits of about \$20 billion annually (PC 2020e, p. 2).

Outside of healthcare, scaling up successful programs can also be hindered by fragmented service provision. For example, in a case study from the criminal justice system, the Productivity Commission found that the South Australian Government reduced the likelihood of offenders returning to custody from 34% to 20% through the Home Detention Integrated Services Program, which offered wraparound support for a wide range of specific offender needs (Cale et al. 2019, p. 9; PC 2021a, p. 84). This created savings of about \$54 000 per participant due to the lower cost of home detention and the reduction in return to custody (PC 2021a, p. 84). But adoption of such novel approaches is low in some other jurisdictions, reflecting the challenges of diffusing and scaling successful programs across relatively fragmented systems.

There are also obstacles unique to public sector diffusion

While there are commonalities, there are also major differences between the public and private sector that affect the capacity, methods and incentives for innovation and diffusion.

Objectives vary and success is hard to measure or even define

In the private sector, the ultimate goal is to maximise profits, which provides a transparent benchmark for the effectiveness of innovation. By the nature of governments' remit, consensus about the public good, the best actions to promote it, the key priorities, and acceptable trade-offs varies across and within governments. In the

public sector, **the objective is to improve the public good** with all the ambiguity that term entails, subject to the constraints imposed by the **sometimes-conflicting interests** of politicians, bureaucrats and lobbyists.

One of the starkest examples of this is that billion dollar public infrastructure projects are more politically saleable than a combination of less conspicuous projects (like better road maintenance), even if the latter have greater net benefits than the former (Ergas 2014, p. 13). Another example is the political challenges associated with phasing out stamp duties on property transfers in favour of a broad-based tax on unimproved land value. While the latter is widely acknowledged as a more efficient tax (and the Productivity Commission has previously recommended that all state and territory governments should make this transition (PC 2017d, p. 20)²⁷), implementing such a change would have differential impacts on various segments of the population and economy.

Incentives are mixed

This is further complicated by the reality that a federal system of government — for all its benefits — leads to (sometimes) **overlapping roles and divergent goals**, which can frustrate the diffusion of innovation. A private business could change its corporate structure in parallel circumstances, but different levels of government must negotiate — sometimes over protracted periods — to achieve reforms that improve the overall public good.

As an illustration of the **complexities of federation**, some of the deficiencies of the health system stem from the fact that the Australian Government funds and regulates primary healthcare, while State and Territory Governments are the managers and predominant funders of hospitals. A few exceptions aside, state- and territory-run local hospital networks have a limited capacity to commission services eligible for MBS payments (under section 19 of the *Health Insurance Act 1973* (Cth)). The Tasmanian Government noted that the current funding model has inhibited innovation in integrated healthcare:

A key barrier to reform for Tasmania has been the restrictions caused by section 19(2) of the *Health Insurance Act 1973* (Cth), which prohibits payments of Medicare benefits where other government funding is provided for that service. Unless there is an exemption, this requirement restricts services that require a mix of, for example, payments to GPs under the Medical Benefits Scheme (MBS) or to hospitals under the Activity Based Funding framework. This is a disincentive to developing integrated models of care that would support a reorientation of care away from hospitals and into the community. (Tasmanian Government, sub. 196, p. 11)

Moreover, while activity-based funding encourages efficiency by funding activities within hospitals, it provides no incentives for hospitals to make investments in out-of-hospital interventions that reduce those activities (PC 2017d, p. 52). Likewise, the Australian Government only captures a share of the dividends from investments in primary care that reduce long-run demand for hospital services and the staff and infrastructure underpinning those services.²⁸ This weakens governments' incentives for action. Even greater messiness ensues from the complex role of heavily government-subsidised and regulated private health insurance.

Housing policy suffers from some similar dilemmas given a mix of shared and competing roles by all levels of government, including funding deficiencies, which suggest significant benefits from a genuinely coordinated approach (PC 2022b).

²⁷ In 2012-13, the ACT Government implemented a 20-year transition to abolish inefficient stamp duties on property sales and move to rates. In July 2022, the NSW Government followed in the ACT's footsteps, though with the significant variation of giving homeowners the option of choosing to pay stamp duty or higher rates.

²⁸ In the medium run, the excess demand for hospital beds means that there are few savings as one group of patients is replaced by others. However, over the longer run, any lasting reductions in demand for hospitals can reduce the need for the highly costly expansion of existing hospital services (PC 2021b, pp. 30–31).

Universal supply to heterogenous groups means no one-size fits all

A major challenge for many government services is that there is an **obligation to supply** them to disparate and geographically dispersed populations across all of Australia. The variety of locations and the heterogeneity of customers mean that **services often must be tailored** to meet local circumstances. Many National Agreements between the Australian, state and territory governments identify priority groups (such as people with a disability or Aboriginal and Torres Strait Islander people) to recognise their specific needs. Service delivery can be very different in regional versus urban locations, especially in thin markets. There are many highly-specific programs aimed at closing the gap. The consequence of the variety and specificity of citizens' needs is that learning from one program or service delivery approach (diffusion) may not translate well to other contexts.

Heterogeneity between jurisdictions can limit diffusion of good practices not only in the design and delivery of government services, but also in the design and implementation of government policies and regulations. For example, notwithstanding the benefits of major re-zoning reforms in Australia's biggest cities (PC 2017d, pp. 145–146, 2022b), progress across most jurisdictions has been slow. This is partly because each state or territory has its own, distinct statutory planning frameworks, lexicons and professions, which makes knowledge sharing between jurisdictions challenging. This inquiry's companion volume *A competitive, dynamic and sustainable future* includes recommendations on how State and Territory Governments could further improve planning and zoning regulation, including by standardising business and industrial zones across local government areas and reducing the number of zones (where possible) while broadening the range of permissible activities.

Local monopolies abound and cannot go broke

Many government-owned or funded services **face little or no competition** from rivals given they are the monopoly provider or meet the needs of different regions. For example, many state schools have restrictive arrangements for out-of-area enrolments, which limits parental choice to a local school. And unlike private (and even not-for-profit) businesses, there are relatively few exits and entries by government-owned service providers, nor much risk of them. This reduces the pressure for innovation and adoption of best practice. In some public services, there is no permitted competition (generally for good reasons) — as in policing, prisons, and the Australian Tax Office.

Norms and regulations discourage innovation

Government services are often **subject to higher levels of prescriptive regulation** and have **risk-averse norms** (ANZSOG 2019). These may be justified for safety, ethical or other reasons, but high levels of regulation and risk aversion can limit the scope to change deficient prescribed practices, require resources to meet regulatory reporting requirements and can reduce the capacity of lower managers to autonomously make changes.

Regulations eat time, and time is a scarce input into innovation and adoption. For example, teachers face high levels of administrative work reportedly due to government and school level bureaucracy, making up 8% of a 'typical' working week (Hunter, Sonnemann and Joiner 2022). This is time that could be spent on better lesson preparation and professional development — this inquiry's companion volume *From learning to growth* included several recommendations that could lead to more effective use of school teachers' time. These included replacing manual administrative processes with technology-based and automated solutions, and more curriculum implementation support such as through centralised provision of high-quality and government-endorsed lesson plans and classroom tools.

Likewise, norms about the desirability and capacity for innovation (whether new altogether or new to the agency) vary across the public sector. In the Australian Public Service, all agencies participate in an annual

census that includes questions about staff attitudes to innovation. While many staff believe one of their key roles is to innovate, far fewer believe this is rewarded and indeed, a minority believe that their agencies accept that failure is sometimes an inevitable feature of innovation or the adoption of new ideas (table 3.1). Other data show that there is considerable variability across agencies in their ratings of innovation and management.

Table 3.1 – Attitudes to innovation in the Australian Public Service 2020-21

Statement	Positive (%)	Neutral (%)	Negative (%)
I believe that one of my responsibilities is to continually look for new ways to improve the way we work	93	5	2
My immediate supervisor encourages me to come up with new or better ways of doing things	82	13	4
People are recognised for coming up with new and innovative ways of working	67	21	11
My agency inspires me to come up with new or better ways of doing things	54	30	17
My agency recognises and supports the notion that failure is a part of innovation	34	38	27

Source: APSC (2021a, p. 11).

In many cases, the barriers to innovation include both norms and regulations. Some of the largest barriers to workforce innovation in key areas of public service delivery, especially healthcare, include funding constraints, regulations, and long standing workplace practices and cultures (Pharmacy Guild of Australia sub. 67; PC 2021b, p. 68). Scope of practice restrictions can frustrate different care models and access to services. The Australia Healthcare & Hospital Association observed:

With evidence that the current organisation of health professionals and their associated scope of practice is not suited to meeting the needs of the Australian health system [...] [w]ithout an overarching strategy to achieve an integrated, multidisciplinary health workforce that works to their top of scope, there will continue to be barriers in the redesign of models of care. Opportunities to develop new models of care with flexible use of the health workforce and innovative funding models should be leveraged. (AHHA, sub. 27, p. 2)

Increased use of electronic records, big data analysis and AI offer scope for some human tasks to be performed by software, as in radiology, though any application requires regulatory approval (van Leeuwen et al. 2021). An emerging technology is model-informed precision dosing, which provides decision support to clinicians that takes account of the unique aspects of patients (age, co-morbidities, sex, ethnicity). But its widespread use in healthcare requires data from electronic health records (which governments typically maintain and develop), funding models, regulatory acceptance and changing norms:

The challenge for Bayesian dosing moving forward is clinical acceptability. Indifference from the medical and healthcare community is understandable. Pharmacometrics is completely absent from medical school programs. Commercial providers rely largely on marketing to sell the concept. Until Bayesian dosing is accepted by the healthcare community as decision-support tools for some drugs, until funders see the economic and clinical benefits, and until regulatory agencies clarify the status of these systems from a regulatory/legal perspective, the future remains uncertain. (Darwich et al. 2021, p. 231)

Australia has made some steps to implement predictive analytics in healthcare, but some evidence suggests it lags many countries, with only 55% of health leaders claiming that they have already adopted this technology or are about to do so (Philips 2022, p. 19). The rate is 66% in the United States and 92% in Singapore.



Finding 5.10

Structural flaws in government frustrate innovation and its diffusion

While slowness partly reflects divergent views about what amounts to best practice or innovation across different governments, there are also major structural flaws in government processes that frustrate innovation and diffusion. Uncoordinated actions of governments and agencies that share overlapping roles, siloed services, clashing funding incentives and risk averse cultural norms tend to work against experimentation. Few publicly operated services experience the risk that poor performance will lead to their closure, unlike businesses.

3.3 What is to be done?

Governments and their agencies often innovate and adopt best practices, as already highlighted in examples throughout this chapter. The challenge is to accelerate these and diffuse learnings about effective approaches across governments and agencies that have yet to adopt such improvements. Many of the ingredients for achieving this are well-known, but underexploited. Governments can use their funding and procurement processes as levers to encourage the adoption of best practices, and also have opportunities to improve diffusion in the ways they run their agencies and deliver services through better use of data, technology, skills and knowledge.

Improving funding and procurement approaches can drive diffusion and innovation

Regular review and update of how government funding is allocated

Given the significant amounts of funding allocated to various government services (discussed above), it is important that these funds are spent on practices and policies that have been proven to deliver desired outcomes. Moreover, these should be periodically reviewed to ensure that funding continues to be allocated based on the most effective approaches, and reflects changing population needs.

For example, public transport fare setting in most jurisdictions suffers from policy inertia (PC 2021c, p. 24). Fare structures are often based on historical settings without much review, with most jurisdictions using simple and ad hoc approaches to setting fares and subsidies that do not systematically address equity or efficiency goals. A superior approach to pricing developed by the Independent Pricing and Regulatory Tribunal has been operational in New South Wales for some years (PC 2021c, p. 18), while Infrastructure Victoria has undertaken considerable research on pricing reforms (Infrastructure Victoria, sub. 10, p. 1), though this is not yet reflected in policy. No other jurisdictions have moved to more sophisticated approaches, but there may be opportunities for governments to adopt more efficient pricing mechanisms and fare structures. This inquiry's companion volume *A competitive, dynamic and sustainable future* includes a recommendation to improve public transport pricing by implementing pricing reforms that have been

suggested by independent bodies and better diffusing learnings about efficient pricing mechanisms across different jurisdictions.

In primary healthcare, the Australian Government is the major funder and a source of clinical guidelines and advice, but it has often struggled to contain unwarranted variations in clinician practice. According to the ACSQHC (sub. 9, p. 7), ‘if clinical variation does not reflect a difference in patients’ clinical needs or preferences, it is unwarranted and can present an opportunity for the system to improve’. Large variations in healthcare can reflect different rates at which new practices spread through the health system or, worse, the persistence of outdated and sometimes harmful practices (ACSQHC 2019, p. 46, 2021b, 2021a; Duckett 2017, pp. 15–17; OECD 2017). Some examples include:

- Over-prescription of antibiotics by GPs can lead to antibiotic resistance. A large percentage of patients are being prescribed antibiotics for conditions for which there is no evidence of health benefits from antibiotic use such as non-infant acute tonsillitis (85% of patients) and bronchitis (82% of patients) (ACSQHC 2021a, pp. 79–80).
- Before changes to the Medical Benefits Schedule (MBS) in 2020 in response to COVID-19, GP telehealth services were very limited, though the technology (the telephone) existed. Payments for telehealth were restricted to only rural or remote areas and aged care facilities, and before mid-2011 were further confined to psychiatric and radiology services (PC 2017d, p. 56; Tran and Haddock 2021, p. 6) despite evidence of their benefits (Moffatt and Eley 2010).
- There are other technologies — such as wearables that gather and communicate health indicators to clinicians in a timely, efficient and unobtrusive manner — that are not supported by the clinical model underpinning MBS funding (MTAA, sub. 33, pp. 5–6).

The striking variation suggests opportunities for improvement through more guidance, monitoring, education, and for some contexts and procedures, de-funding. The MBS was first introduced in 1984 and before 2015-16 had never been subject to a comprehensive review despite substantial changes to medical practice (Medicare Benefit Schedule Review Taskforce 2020, p. 1).

The government should regularly update the MBS so that funding is only provided to treatments that reflect medical best practice, based on medical research both domestically and from overseas. Comprehensive reviews take significant amounts of time — for example, the comprehensive MBS review that started in 2015 was completed in 2020. As research and feedback on medical best practice is constantly emerging, updates to the MBS should occur more frequently and on a rolling basis where there is evidence that questions the efficacy or cost effectiveness of existing treatments. A systematic mechanism for this to occur would be for the Medical Services Advisory Committee (MSAC) to undertake an annual review of selected MBS items to determine whether they should continue to receive government subsidies. The list of items to be reviewed each year should be targeted based on:

- treatments where emerging Australian and/or international evidence questions the efficacy or cost effectiveness of existing procedures, including treatments that international bodies (such as the UK’s National Institute for Health and Care Excellence) have recommended de-funding or replacing with new treatments
- treatments that MSAC has received clinician feedback on doubting their effectiveness
- highly costly treatments that receive large government subsidies through the MBS and have not been reviewed in the past 10 years.

While MSAC’s remit already includes considering amendments to existing services funded by the MBS, much of its current activities focus on assessing new MBS items rather than re-evaluating existing ones. More prominently incorporating such annual assessments as a standing function of MSAC may require the Australian Government to provide higher levels of funding to MSAC so that it has the resources and capabilities to undertake regular targeted reviews.

Overcoming funding models that undermine innovation and best practice

Healthcare funding models

Funding models should reward increases in the quality and efficiency of outputs and encourage cost reductions for government service bundles, whether that service is ultimately delivered by government or an external service provider. The word ‘bundle’ is important because many existing government-funded services are unbundled (or siloed) and then provided or managed separately by different arms and levels of government.

The prime example of such siloing is healthcare with its fractured funding and governance mechanisms. The customer is equally fractured by unbundled services. They are a customer of a pharmacist, a patient to a GP, an admission to a hospital and a case to an outpatient service — four different people through the eyes of the current system. It makes sense to re-assemble them into one human being and provide them integrated care at whatever point they touch the system.

Healthcare funding, delivery and oversight should be managed as if there was only one level of government holding responsibility for it, recognising that creating this single virtual agent requires re-configuration of existing government funding models, changes in regulations (such as the *Health Insurance Act 1973* (Cth)) and greater data sharing between different parts of the health system. The latter is discussed in this inquiry’s companion volume *Australia’s data and digital dividend*, which recommends that the government implements improvements to My Health Record so that it can be the foundation for a comprehensive health data sharing system across all parts of the healthcare sector.

Various capitation models, such as the Victorian HealthLinks program, are promising contenders for wider application for chronic disease management and preventative care, as are bundling payment models for conditions (such as hip and knee replacements) that need predictable coordinated care spanning the whole health sector. The ideas of the Consumers Health Forum of Australia (2020), various reports from the Productivity Commission (PC 2017d, 2020e), the Grattan Institute (Breadon 2022; Duckett 2017, 2018b; Swerissen and Duckett 2018) and others have set out reform directions that could apply at a greater scale, even if the details vary.

The institutional and funding models to support reform of hospital funding are much better developed than under the previous health agreement between the Australian, State and Territory governments. Under the 2020 addendum to the National Health Reform Agreement, the Independent Hospital Pricing Authority (now the Independent Hospital and Aged Care Pricing Authority — IHACPA) has the capacity to reimburse hospitals for their participation in state-sponsored innovative fixed-term funding trials (First Ministers 2020; IHPA 2022). IHACPA will advise governments on any trial that might be nationally applied, yet there is no formal transition path to any Australia-wide systemic change to hospital funding.

The advantage of new funding models is not just that they bring to fruition ideas that have long been advanced and used overseas, but that they underpin the diffusion of other innovations. Were a hospital given appropriate incentives, there are hundreds of novel ways of preventing unnecessary, or shortening the duration of, hospitalisation that it could be motivated to introduce. Similarly, new funding models for improved primary care — even if not directly coordinated with hospitals — can better manage and prevent chronic disease, as shown in the case studies examined by the Productivity Commission (PC 2021b). The main problem is not a lack of appetite for changes in funding models, but the slow pace of scaling up promising initiatives. The rapidity of health system adaptations to the COVID-19 pandemic suggests that there should be scope for acceleration.

Contract lengths for human services

Contract terms set by governments can frustrate innovation and diffusion through excessive prescription (PC 2016b, p. 32) and limit the capacity for user choice to encourage best practice and innovation among service providers. Funding contracts for community organisations delivering government-funded services are often too short (sometimes only 12 months) and with low certainty of renewal. This limits the capacity for community organisations to set up, develop their skills and processes, learn from experience, and invest in innovation. Re-tendering can also take up considerable resources and management time better spent on raising the performance and capability of the agency.

While shorter-term contracts may seem to control risks, there are other ways of doing this without stifling innovation. In its assessment of various government services, the Productivity Commission concluded that contract durations should be longer than the usual default. The Commission recommended default contract lengths of a minimum of seven years for providers of children and family services in the Northern Territory (PC 2020b, p. 37), which is consistent an earlier finding of seven years as an appropriate contract length for human services generally (PC 2017c, p. 24). The appropriate contract length may vary depending on several factors, such as the type of service being provided and the location of provision; for example, the Commission's mental health inquiry recommended that funding cycles for psychosocial support services should be increased to a minimum of five years (PC 2020e, p. 843). Suitable contract lengths could be reconsidered for contracts that are retendered upon their expiry.

A citizen-centred approach to funding

Funding models for government services centred on consumer-directed control underpin a different kind of diffusion and innovation — the capacity for consumers to engage imaginatively with mainstream providers, and for providers to compete based on their ability to service consumers' needs. On the one hand, contract and funding arrangements can diffuse best practice among providers for *that* model of service provision. But in many cases, best practice is to let the citizen decide how to arrange the services that meet their preferences, subject to an appropriate budget limit. Citizen-centred funding models are particularly beneficial for delivering human services, as they allow service providers to receive signals from citizens about what they value most, with the flexibility for providers to implement innovations that can meet these needs in either a specialised or general way depending on the citizen's preferences. This applies both for human services delivered by government and those funded by government and delivered by an external provider.

An example of this from a previous Productivity Commission inquiry (PC 2011) was of a young person with Down's Syndrome who used to receive services from specialist disability providers, being picked up by a bus for people with disabilities and taken to activities that might or might not interest them. When given a budget for services, the person learned how to take public transport, to go the cinema and to buy her favourite meal from McDonalds, which she loved. Best practice was not the achievement of the most efficient allocation of resources *within* an enterprise, but the meeting of the preferences of the person.

Governments can much better diffuse this different way of organising resources in some of its other services. For instance, in the housing policy space, the Commission noted that financial assistance to people in need should be user-centred and enable them 'to have a genuine choice over where they live [which] would improve the responsiveness of the social housing system to the requirements of tenants by increasing competition between housing providers' (PC 2017c, p. 15). It also found in the 2022 *Housing and Homelessness Agreement Review* that delivering housing assistance through government subsidies tied to properties can lock renters into homes that do not meet their needs, as should preferences and circumstances change they are unable to move without losing the assistance (PC 2022b, p. 281).

There are also other human services where governments could encourage provider innovation and improve resource allocation via a more citizen-centred approach. This includes end-of-life care, where governments should initially prioritise ensuring wider availability of high-quality services that place users' interests at the centre of delivery and, in the long term, offer users choice of provider where feasible (PC 2017c, p. 138). And in public dental services, 'giving users greater choice over their dental provider can also generate incentives for providers to be more responsive to patients' needs as they are only funded when users choose them' (PC 2017c, p. 387). And healthcare is another policy area where governments can shift to a more person-centred funding approach to foster innovation and improve patient outcomes. More co-operative funding mechanisms would enable more integrated healthcare centred on a patient's needs, such as by encouraging longer-term and/or preventative care, which are not well supported by the current health funding system (PC 2021b, p. 145).



Recommendation 5.6

Using health and human service funding approaches to improve diffusion

Governments should use their funding and procurement approaches to drive improved efficacy, innovation and diffusion in health and human services that they deliver or contract external service providers to deliver. This could include:

- improving the diffusion of good practice in primary healthcare by regularly updating the Medicare Benefits Schedule (MBS) to reflect effective treatments. The Medical Services Advisory Committee (MSAC) should be required to undertake an annual rolling review of selected MBS items, focusing on treatments where emerging evidence or clinician feedback questions their efficacy or cost effectiveness. The Australian Government should assess the need for higher levels of funding for MSAC to undertake these annual reviews as a standing function
- implementing funding models that support the diffusion of innovation in healthcare, including preventative care, and a more patient-centred approach by aligning incentives across different parts of the health system. This includes by accelerating and scaling up long-term co-operative funding mechanisms that align the incentives of primary and hospital providers to avoid costly hospital admissions and support integrated care, such as capitation models that have demonstrated success and other mechanisms supported by the Independent Hospital and Aged Care Pricing Authority. Governments should also seek to overcome obstacles to implementing co-operative models, such as changing the *Health Insurance Act 1973* (Cth) and improving data sharing
- encouraging human service providers to innovate and compete to meet consumers' needs by providing citizens with more control over how government funding allocated to these services is spent. This could apply to the allocation of housing assistance to people rather than properties, end-of-life care, public dental services and healthcare
- increasing default contract lengths to 5–7 years for government-funded services delivered by community organisations to support innovation and diffusion. Suitable contract lengths will depend on the type of service provided, and the lengths of contracts that are retendered could be reconsidered upon their expiry.

More broadly, funding models and regulatory settings for health and human services have tended to be focused on inputs rather than outcomes. For example, fixed labour ratios are a feature of many of these services, including in hospitals and child care provision, and activity-based funding — while leading to efficiency gains in the past (discussed above) — can lead to providers limiting the design and delivery of their services to the specific activities that are funded. These approaches often exist for good reason. In

government-funded human services, consumers may have incomplete information about the quality of providers, are often vulnerable (due to age or disability) and have fewer incentives to properly hold providers to account (as they do not face the full cost of their service).

However, these input measures can inhibit service providers from adopting innovations that would deliver the same, or better, outcomes for consumers. The benefits of regulating for quality assurance therefore need to be balanced against the costs from discouraging productivity-enhancing innovation. Shifting towards outcomes-based approaches to allocating funding and regulating quality would give providers more flexibility to adopt innovations that allow them to meet their obligations in the most effective and efficient way possible. Such a shift could also include exemptions from input measures if a provider can demonstrate that they have achieved quality in other ways. This should be a longer-term reform direction pursued by governments at all levels, to incentivise innovation, competition and productivity gains in these government-funded services.

One prerequisite for doing this is improving data collection about the outcomes that matter in health and human services and better understanding the factors underpinning differences in performance (so that outcomes-based funding can be implemented to account for these factors, where they are not within the control of service providers). This is discussed further below and in recommendation 5.9.



Finding 5.11

Funding models and regulatory settings based on input measures can stifle innovation

While input-based approaches to funding models and regulatory settings (such as fixed labour ratios and activity-based funding) can have benefits for quality assurance, they can also limit the potential for innovation in government service delivery. Shifting towards outcomes-based approaches to allocating funding and regulating quality would give service providers more flexibility to adopt innovations that allow them to meet their obligations in the most effective and efficient way possible.

Infrastructure and equipment procurement

Outside of human services, there are other ways in which government procurement could encourage best practice. Procurement of public infrastructure like roads, bridges, hospitals, and prisons has often preserved out-of-date approaches that have constrained collaboration and innovation and missed opportunities for deferring upgrades and replacements. For example, it has been estimated that 37% of requests for proposals in public infrastructure projects suffer from unclear project objectives (DAE 2015, p. ii). Some 45% of professional service firms commissioned by the public sector for infrastructure projects say their clients were unresponsive to innovative suggestions during tender processes (ibid p. vi).

For their part, current key users and constructors are pessimistic about government and industry's overall uptake of best practice procurement approaches. Roads Australia (sub. 25, pp. 3–4) argued that the state and territory pipeline for new infrastructure has been overly ambitious given that governments and industry struggle with 'outdated, inflexible commercial frameworks', notwithstanding superior options. The Civil Contractors Federation considered that adoption of best practice in government procurement had been weakened by the loss of in-house technical capability in procurement agencies (sub. 38, p. 3). This highlights that one of the key determinants of adoption of best practice are the skills of government agencies. Moreover, all states are undertaking large complex projects with major exposure to risks of cost blowouts, design flaws, delay and uncertain patronage, but without (it seems) sufficient knowledge sharing between them about the contractual and other ways these risks may be mitigated.

One approach that has the potential to drive better quality and productivity outcomes in public infrastructure is the use of collaborative construction procurement models, in which contractors are involved early in the planning and scoping stages of the project (Australian Constructors Association, sub. 73, p. 8; IA 2022). This will require strengthening expertise in public sector procurement agencies, as well as greater understanding of alliance and collaborative contracting models.

There are a small number of recent examples of public infrastructure procurement with more collaboration between the government client and contractor, including Transport for New South Wales and Victoria's Major Transport Infrastructure Authority (which oversees the Level Crossing Removal Project) trialling Incentivised Target Cost contracts (Roads Australia, sub. 151, p. 2). The Australian Constructors Association commented that the use of relational contracting in the Level Crossing Removal Project has led to higher productivity and enhanced innovation. Contracts were structured to allow construction teams that achieved minimum standards on a crossing removal to be employed for future crossing removals, thereby 'reducing the churn of people and maintaining that knowledge base on the job' (ACA, trans., p. 84). However, some stakeholders have highlighted that there are still areas for improvement (Roads Australia, sub. 151, p. 2).



Recommendation 5.7

Collaborative procurement on major projects to increase productivity

The Australian, State and Territory Governments should improve the quality and productivity outcomes of public infrastructure projects by increasing the use of alliance contracting or collaborative contracting for major projects, so that contractors are involved earlier in the planning and scoping stages of a project. This could also include building incentives into contracts for the achievement of certain targets or standards.

In some instances, best practice procurement is not to procure at all because the dollars could be spent elsewhere on better outcomes for the public. The oft-repeated admonition to apply genuine, disinterested, rigorous cost-benefit analysis (CBA) of major projects suffers from its forgettability. Everyone says it is a good idea. All jurisdictions and many agencies have developed guides about how to do it (see, for example, ATAP 2018; Infrastructure Australia 2021). Essential elements of best practice CBA include independent evaluation of assumptions and inputs (such as cost estimates and demand or benefit forecasts, involving external experts where required), transparency (for example, showing breakdowns of cost and benefit calculations and being clear on how different scenarios were selected) and accountability (by governments as to how CBA outcomes have been used — or not used — in their project decisions).

But compliance with best practice is piecemeal, and the outcomes of the analysis may not have any effect on project choice. The consequence is that big public infrastructure projects routinely suffer from optimism bias, with large cost blowouts and long completion delays. In 2020, the Grattan Institute estimated that cost overruns on transport infrastructure in the preceding two decades totalled \$34 billion in government expenditure, and that at the time of writing six current projects (including Inland Rail, Melbourne's North East Link and the Sydney Metro City & Southwest) had already accrued cost overruns of \$24 billion (Terrill, Emslie and Moran 2020, p. 3). More recently, many infrastructure projects involving substantial public funds were committed to by governments before Infrastructure Australia had completed an assessment (Terrill 2022, p. 28). Even if improving the use of CBAs only leads to a slight shift in government decision making and a small reduction in cost overruns in percentage terms, this would amount to substantial improvements in resource allocation and efficiency gains in dollar terms given the size of these projects.

Governments should therefore commit to institutional and governance arrangements that adopt the aforementioned elements of best practice CBA. An example of such an institutional arrangement is the Washington State Institute for Public Policy (WSIPP) in the United States. WSIPP is a non-partisan public research group that applies a consistent CBA model across multiple state-level policies to provide 'policymakers and budget writers with a list of well-researched public policies that can, with a high degree of certainty, lead to better statewide outcomes coupled with a more efficient use of taxpayer dollars' (WSIPP 2019). It uses a standardised set of measures to promote comparability, including a normalised approach to meta-analysis that generates consistent (but context dependent) measures of effect sizes (WSIPP nd, pp. 2–4) and a prescribed method for conducting sensitivity analysis on costs and benefits (WSIPP nd, p. 2). This improves transparency by giving the public reliable and comparable measures to gauge the effectiveness of a range of policies.

In Australia, the government has committed to establishing an Evaluator General, which aims to improve the measurement of policy and project outcomes and work with other government departments to conduct high-quality program evaluations (Leigh 2018, 2022). Such an entity could be a starting point for improving CBA practices (for example, by providing independent evaluation of CBA assumptions and inputs), noting that the proposal is at the Commonwealth level, so efforts would still be required to increase the quality, consistency and comparability of CBAs undertaken at the state and territory level.

While improving the quality of CBAs is important, whether government officials select projects in line with the results of robust CBAs is another matter. At a minimum, CBAs should be provided to government decision makers before an investment decision is made, so that the results can be factored into project choice. The Grattan Institute previously recommended that before government funds are committed to an infrastructure project valued at \$100 million or more, independent infrastructure advisory bodies in the states and at the Commonwealth level should have a legislated role to independently assess the quality and assumptions underpinning the project's business case, costs and benefits, and publish this assessment. Although ultimately the project decision would still be made by an elected government official, 'the scrutiny on cost management and infrastructure investment decisions would be increased. This scrutiny would serve to better align politicians' incentives to the public interest' (Terrill, Emslie and Moran 2020, p. 34).

While harder to do, and probably more open to manipulation, CBA also has strong relevance to other government activities like defence, social programs, and healthcare. Dobes (2008) argued that the traditions and expertise of these areas of government predisposes them to use other tools for assessment, like cost effectiveness studies, which provides less guidance to governments about how to allocate finite budgets across projects that are very different in their nature. That assessment remains relevant. Notably, an assessment by the Productivity Commission of programs for Aboriginal and Torres Strait Islander people found CBA and other tools to measure outcomes were rarely used (PC 2020a). But while billions seem to be on the pavement for the picking, a proven tool is neglected. There is a strong need for practical solutions to this predicament.



Recommendation 5.8

Improving the efficacy of public expenditure through better investment decisions

Governments can improve the efficacy and productivity outcomes of public expenditure through institutional and governance arrangements that address the systemic absence or disregard of rigorous cost-benefit analysis (CBA) for both major infrastructure projects and in other government activities, such as defence and social services. Such arrangements should include:

- independent evaluation of the assumptions and inputs used in a CBA, which could be undertaken by a single institution across the State, Territory and Commonwealth levels to support consistency and comparability across different projects and programs. The proposed Evaluator General at the Commonwealth level could be a starting point for this improvement
- transparency about the analysis, including on cost and benefit estimates and forecasts and scenario selection, with independent assessments to be published and provided to government decision makers before an investment decision is made
- government officials aligning their investment decisions with CBA results, and being held accountable for how the CBA outcomes are used — or not used — in project selection.

Defence procurement has long been a contentious issue, bedevilled by concerns about mixed and often inconsistent objectives (defence capability *and* assistance to industry), cost overruns, technical failures, and the weighting given to Australian exceptionalism ('we have unique needs').

Some problems arise from the extraordinary complexity of much defence equipment, systems, and software. Complex defence equipment and associated software involves sophisticated manufacturing, information technologies and a highly-skilled workforce. These are slow and risky to develop for bespoke and specialised capabilities. Such capabilities also require other specialised inputs, such as training systems, facilities, and documentation, and involves costs to integrate the new technology into existing ones (Hellyer 2022).

It is not feasible for Australia to develop expertise or domestic capabilities for all such equipment and software. Moreover, attempting to undertake multiple defence projects can slow down the production of any single one, which lowers productivity. It can also pay to wait if government plans to produce equipment already in production overseas, as there can be learning economies as global production ramps up (Markowski, Hall and Wylie 2010, p. 91ff). The early adoption of complex equipment may require adaptation to remedy design and production flaws that only become clear after commencement of production.

Depending on the context, buying an already proven technology from overseas and not quickly, if ever, developing a domestic *production* capability is likely to be optimal in many contexts. A sophisticated domestic capability to use, store and maintain equipment would still be required regardless of where it was sourced from but would involve lower costs than domestic production and assembly.

The Productivity Commission has catalogued instances of large defence procurement projects that involve effective rates of assistance for domestic production of up to 300% (PC 2019, p. 34). This is an extraordinary rate in the context of the other industry assistance, which has dwindled to between 0 and 5%. The transparency that would normally apply for many other procurement activities is lower because of security concerns, though this does not justify the present level of opacity. The Australian National Audit Office, for example, was prevented from publishing its conclusions on the effectiveness and value for money of the \$2.2 billion acquisition of the Hawkei vehicle (PC 2020i, p. 17).

The ambitious Collins class submarine program provides an example of what can go wrong and what might be done to shift the procurement mindset. At conception in 1982, the goal was to acquire 10 boats at \$100 million each (1982). By December 1999, the cost of the fewer planned boats was \$850 million each (Woolner 2001). Of the five boats in the water in 1999, none were performing adequately (McIntosh and Prescott 1999). The problems stemmed not just from the inevitable difficulties in acquiring highly complex products, but from the unique design, the contracting model, the decision to build locally, and project oversight among many other things. Not all aspects of the Collins program were disastrous, but defence acquisitions are so costly to taxpayers and so important for effective defence, that the returns from getting closer to best practice procurement and management would be worth tens of billions of dollars. (Defence spending is anticipated to be about \$270 billion over the next decade (Department of Defence 2022, p. 9).)

Defence procurement is ripe for deep and disinterested scrutiny of its processes. There are strong grounds for re-thinking defence procurement, drawing on advice from those outside defence. The independent Defence Strategic Review has been tasked with ‘identify[ing] and prioritis[ing] the estate, infrastructure, disposition, logistics and security investments required to provide Australia with the Defence force posture required by 2032-33’ (Australian Government 2022a, p. 2), including outlining future investment, mobilisation and funding needs. It provides an opportunity to consider the issues outlined in this report and will deliver its recommendations to government no later than March 2023.



Finding 5.12

Defence procurement has often had mixed goals, used imperfect processes that have led to cost-overruns and failed to achieve the desired capabilities

Defence procurement has often had the mixed goals of achieving a defence capability and providing industry assistance. Imperfect processes have led to cost-overruns of billions of dollars and failed to achieve the desired capabilities. The productivity and efficiency benefits of better practices are large given the \$270 billion of anticipated defence spending over the next decade.

Other opportunities to improve public sector diffusion

Data, benchmarking and accountability

Benchmarking can provide good incentives for public sector services to adopt best practice. Governments are already sophisticated at benchmarking their performance with reporting across many services — as in the Productivity Commission’s *Report on Government Services*, MySchools, MyHospitals, the Australian Atlas of Healthcare Variations, and publication of sentinel events in hospitals. State and territory governments have developed (and continue to refine) measures of the comparative performance of the more than 550 local governments providing municipal services (with a Victorian benchmarking tool shown in figure 3.2). The benchmarking tools improve the accountability of local governments to their citizens and provide incentives for them to improve their practices. This is buttressed by a range of non-government agencies that provide benchmarking models that pool data from local governments to deliver individualised advice on improvements (Smith 2021).

Figure 3.2 – Benchmarking local government performance

Benchmarking garbage collection costs across local governments in Victoria



Source: VAGO (nd).

New assessment instruments, such as Patient Reported Experience Measures (PREMs) and Patient Reported Outcome Measures (PROMs) have been developed to get better feedback on outcomes from patients and are in tune with the re-orientation of healthcare to a patient-centred model. At August 2022, there were 275 validated condition-specific PROMs (ACSQHC 2022). The Productivity Commission has previously noted that putting greater emphasis on reporting such patient-centric outcomes, as well as indicators on clinical outcomes such as hospital readmission rates, would further encourage self-improvement across the healthcare sector (PC 2017c, p. 53). This would also assist in reducing variation in health service delivery across different providers (section 3.2).

There are pitfalls in benchmarking than can undermine its credibility, such as the risk that parties have incentives to manipulate embarrassing data. This occurred in the ACT when 11 700 records were found to have been falsified for Canberra Hospital over a three-year period (ACTAO 2012, p. 11). It has been alleged that some schools — wary of the reputational damage of poor NAPLAN results — discouraged some students from sitting the exam, though there is little evidence of the extent of the issue (EERC 2014, p. 17; McGaw, Loudon and Wyatt-Smith 2020, p. 78). Audits and whistleblowing can help limit these risks, but so too can deeper analysis of data.

As data gathering and linking by governments increase, the scope for deeper analysis of why there are variations in performance will grow and provide a stronger evidence base for scrutinising the performance of government-funded or operated organisations. For example, school performance depends on funding,

student background and traits, and teacher and leader quality among other things. Without controlling for such aspects, a school might appear to perform poorly despite being a high performer given the characteristics of its students. Evidence about what works in the classroom needs observation and data linked across students and schools. The Commission's assessment of the National School Reform Agreement (PC 2022c) highlighted that a unique student identifier for school students nationwide would open up the capacity for richer understanding of the determinants of school and student performance. As discussed in this Inquiry's companion volume on digital technologies, *Australia's data and digital dividend*, the ongoing creation and integration of government datasets will be a major source of value.

Accordingly, the next big and ambitious step for benchmarking data across all significant government services is to provide more like-with-like comparisons that enable a publicly funded or delivered service in any given area to grasp how far away they are from the frontier and why that is so. For example, the benchmarking comparisons of local government garbage collection costs in figure 3.2 would be enhanced if it controlled for the population of the area and its density. And the Commission has previously recommended that in healthcare, reporting at the individual practitioner level (for instance, individual specialists and allied health professionals) should include both clinical outcomes and details such as location, activity levels and out-of-pocket charges, to facilitate better comparisons and more targeted performance improvements (PC 2017c, p. 53).



Recommendation 5.9

Using performance data on government services to diffuse best practice

Governments should collect and use data on service outcomes and provider performance to benchmark their own service delivery and diffuse best practice. This should go beyond simple descriptive performance comparisons by providing more like-with-like comparisons, so that governments and service providers can understand what is driving differences in performance and how, when not justified, these differences could be narrowed.

Skills in the public service workforce

The Thodey review (PMC 2019) found many flaws in the Australian Public Service in which skill and leadership deficiencies were predominant. (Some of these problems are manifest in the results shown in figure 3.1.) Similar issues will affect public sector organisations across all levels of government and functions, especially considering economy-wide skill pressures.

The vast numbers of people employed in the public sector — about 250 000 in the Australian Government, 1.7 million in state and territory governments and 190 000 in local government (ABS 2021b) — means that there will be natural variation in people's aptitudes. While overall performance can be raised, there are limits. Nor is it unambiguously beneficial to attract more of the 'best and brightest' into the public sector. They are also critical in the business and not-for-profit sectors. In teaching, for example, the appropriate aspiration may be to attract the *good* (and those best suited to the role) and to better use pedagogy, coaching and software to maximise their effectiveness as teachers.

But one area where skills could readily be augmented without significant cost is through a reformed immigration system. As discussed in chapters 1 and 2, the movement of people between different organisations is an important conduit for transferring ideas.

While this inquiry's companion volume *A competitive, dynamic and sustainable future* discusses improvements to Australia's skilled migration policy more generally (many of which are as apt for public services as they are for the business sector), there are specific restrictions to recruiting people from outside Australia in the public sector that are stifling innovation and diffusion of global best practice in government agencies. These include antiquated security, citizenship and residency requirements; in particular, Australian citizenship is a usual requirement for permanent appointments to the Australian Public Service. Across public service agencies, there are processes to gain exemptions, but they are unduly bureaucratic.

Lowering the transaction costs of attracting people outside Australia to be in the public sector would raise skill levels, but above all bring new ideas from countries with different models of public sector services. One way of implementing this could be to have expedited security approval processes for overseas workers that have already obtained similar levels of clearance in their home country, where Australia has a security or intelligence agreement with that country (for example, the Five Eyes alliance). For example, some stakeholders have proposed that as part of the AUKUS agreement, there could be an accelerated security clearance process whereby UK or US workers who have been vetted in their home country could be considered for security clearance to work on defence projects in the Australian Public Service, regardless of Australian citizenship (PwC Australia, American Chamber of Commerce in Australia, and Australian British Chamber of Commerce 2022, pp. 25–26).



Recommendation 5.10

Recruiting public sector workers from overseas to bring in global best practice

Improve the diffusion of global best practice in the public service by loosening the security and citizenship requirements, and overly bureaucratic processes, which currently limit the recruitment of workers from outside Australia who bring innovative ideas and different models to the public service. This could include expedited security approval processes for overseas workers who have already obtained similar levels of security clearance in their home country, where Australia has a security or intelligence agreement with that country (for example, the Five Eyes alliance).

Diffusion bodies and innovation funds with a charter for diffusion

Good ideas often languish because they are lost in the quagmire of other information, are poorly communicated, have not been validated, but above all, require costly changes to the recipient organisation. Those costs arise due to crowded agendas, time poverty, limitations in skills, incompatible software, resistant cultures, and lack of clarity about effective implementation. Moving people with the ideas into the recipient organisation is one avenue because they can gain trust and know the details about implementation — for example, staff secondments from one government department to another enable learnings about designing and implementing programs to be transferred between different (but related) policy areas (APSC 2021b). But this will rarely be an option if the innovation comes from one organisation without adequate resourcing for this diffusion function, as was evident in many of the Productivity Commission's case studies of innovative practices in managing and preventing chronic disease.

There are several options to reduce these problems.

- Show how a potential recipient's organisation is faring compared with similar organisations to motivate adoption (see benchmarking, discussed above).

- Demonstrate concretely the value of a new way of doing something, supported by evaluation, and showing that scaling up of the idea is feasible.
 - Just publishing evaluations is a good step. In the area of Indigenous program evaluation, the Productivity Commission found that of 509 Australian programs from 2016-17 to 2019-20, only 44% were public (PC 2020d, p. 104). More publication of evaluations could be a focus of the government's proposed Evaluator General (discussed above).
 - Innovative new approaches adopted by one service provider can be used as case studies that others can learn from. For example, in healthcare, Monash Watch is a Victorian telephone outreach program that identifies people at risk of repeat hospitalisations and supports continuous health checks and support services through Care Guides who call consumers regularly, and Health Coaches who triage the calls and arrange necessary health services. Interim results show that Monash Watch is achieving a 20-25% reduction in hospital acute emergency bed days compared with usual care (PC 2021b, p. 61). Monash Watch has already expanded from its original location in Dandenong with a second team operating in Cranbourne. Moreover, the initiative is being incorporated into Monash Health more broadly and the approach is expanding to other health services across Victoria.
- Exploit the reputation of existing longstanding institutions with strong brand names that already act as repositories of best practice to be more active disseminators using the now established principles of implementation science.
 - For example, this includes the Australian Commission on Safety and Quality in Health Care for healthcare; the CSIRO for science and research; and the Australian National Audit Office for public administration. Newer bodies such as the Australian Education Research Organisation for school education and Aged Care Research and Industry Innovation Australia for aged care could also play a significant role in diffusing best practice in the future.
- Use existing networks. Regulators and service providers across jurisdictions often meet (for example, competition regulators, liquor and gambling licensing bodies, primary health networks). The norm — encouraged by government — should be consideration of adopting innovations developed in one organisation to another.
- Encourage open standards so that software compatibility problems reduce over time.
- Appoint dedicated diffusion champions to diffuse best practice and new technologies from around Australia (and global peers). These champions would generally be in the longstanding institutions described above.

A challenge in some areas of the public sector is that there is **no obvious body to act as a diffuser**. In some instances, it may be worthwhile establishing a generic innovation fund that supports public sector innovation and then diffuse it. The Victorian Public Sector Innovation Fund is an example, though its effectiveness is unknown. In its Mental Health Inquiry, the Productivity Commission proposed a Mental Health Innovation Fund to trial and evaluate innovative service delivery, system organisation and payment models (which so far, has not been implemented). Where there are material gaps, there may be grounds for similar bodies.

This is especially so where government-funded services are delivered by smaller and highly decentralised organisations (as in employment service providers, disability and childcare) that have little expertise in diffusion, few resources and little individual motivation to invest in activities whose returns are spread over the whole industry.

A hazard in some efforts to diffuse ideas is that they are based on **loose networks with insufficient focus and funding** to sustain them. The Public Sector Innovation Network had lofty goals for diffusing best practice

methodologies and a place for developing networks between experts in the Australian Public Service. But it appears to have vanished (DISR 2020), though ghosts of its presence still linger on the web (Australian Government 2022b). There may be grounds for encouraging new diffusion networks, but only if they are sufficiently focussed, involve practitioners in the relevant area, and have a clear goal of diffusion.

In some instances — such as (virtual and physical) communities of practice — there are often strong enough incentives for participants to sustain the network and to share their knowledge because they obtain day-to-day benefits and share a direct interest in the knowledge being exchanged (Mullan et al. 2022; Shaw et al. 2022). But networks that lack those features and involve **discretionary efforts by busy people** across agencies and service providers rarely survive because the enthusiastic people move on or because urgent tasks displace longer-term goals.



Recommendation 5.11 A bigger role for diffusion bodies

Expand or strengthen the role of existing diffusion bodies — such as the Australian Commission on Safety and Quality in Health Care, Aged Care Research and Industry Innovation Australia, Australian Education Research Organisation, CSIRO and Australian National Audit Office — with the aim of disseminating best practice, including the elimination of practices no longer underpinned by adequate evidence. Trial innovation funds in selected public services where there is no existing body for diffusing best practice, such as in mental health service delivery.

Foundations for diffusing regtech

Governments can facilitate more use of technology and diffusion of best practice in many industries through its use of and support for regulatory technology, or ‘regtech’. Regtech can be a more efficient way of designing and implementing regulation for both businesses and government, as well as improving the quality of regulation and opening up new opportunities for streamlined regulation (PC 2020h, p. 9).

For example, in the agriculture industry, the Australian Government is providing grants for regtech initiatives that can assist in streamlining compliance obligations, improve traceability across agricultural supply chains and ultimately increase regulatory efficiency in the sector (DAFF nd). And the single touch payroll (STP) system has enabled businesses to automatically report their pay, tax and superannuation data to the Australian Tax Office via their STP-enabled payroll accounting software, resulting in lower compliance costs and greater speed and accuracy. (The benefits of this initiative, including providing rapid monitoring of the economic impacts of COVID-19 (Andrews, Hambur and Bahar 2021; PC 2020h, p. 10, 2022a, pp. 48–49) and stimulating the take-up of technology by small businesses, are discussed in further detail in this inquiry’s companion volume *Australia’s data and digital dividend*.)

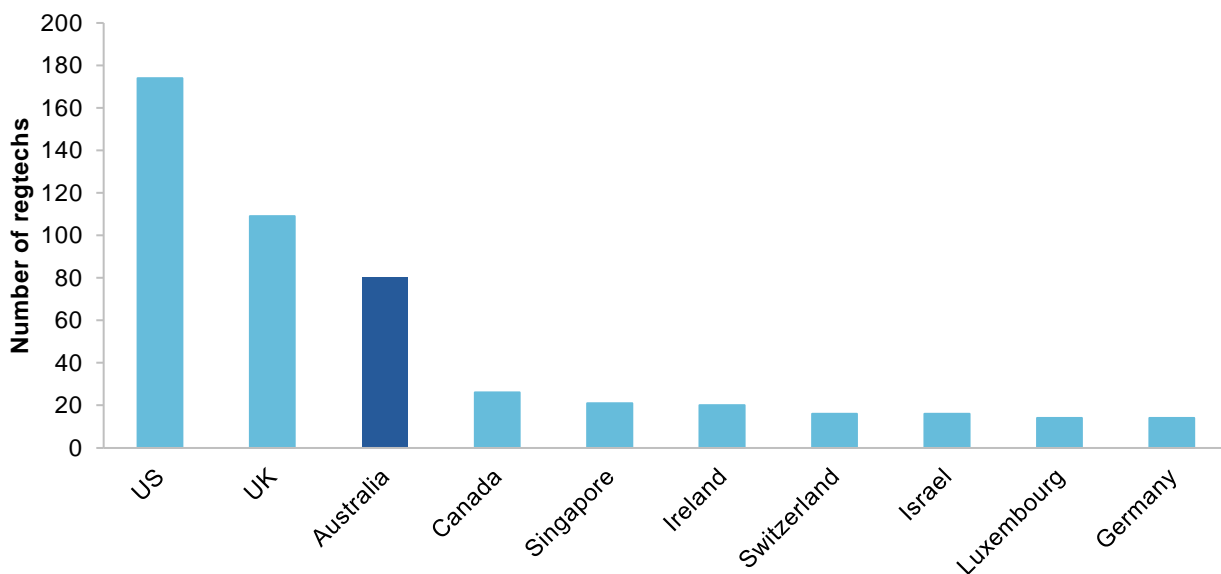
Regulations can be implemented in a way that lends itself to developing regtech solutions, such as through the coding of regulatory rules into machine-interpretable formats (PC 2020h, p. 24), which makes the details of complex regulation easily accessible to regtech software providers. Creating regulatory ‘rules as code’, such as the NSW Government’s machine-readable version of the *Community Gaming Regulation 2020* (NSW), ‘allows industry and government to embed digital rules directly into their IT systems to streamline compliance and automate any changes in the future. In addition, consumers are able to navigate this digital version of the regulation easily via an interactive questionnaire’ (ACMA 2021, pp. 12–13). When new regulations are likely to be amenable to a regtech solution, governments should implement them in a

machine-interpretable format at the outset, so as to avoid the need to go back and codify such regulations in the future (which may be more costly).

Relatedly, the government has an important role to play in promulgating consistent data fields and formats that can be used in regtech, such as work the ATO has done through the Digital Partnership Office (see this inquiry’s companion volume *Australia’s data and digital dividend*). For example, in the case of Standard Business Reporting, the Australian Government’s taxonomy and list of data fields allowed digital service providers to build new compliance solutions to automate regulatory reporting for businesses (PC 2020h, p. 23).

Software providers can use existing databases to create regtech solutions; however, by adopting a ‘rules as code’ approach and consistent data standards, governments make it easier for industry to design compliant solutions. Working with providers of regtech solutions can assist in identifying areas that would benefit most from these approaches. There were about 80 regtech providers headquartered in Australia in 2020, which compared favourably relative to other developed countries (figure 3.3), suggesting there is scope for government and industry to collaborate in rolling out regtech solutions. This can improve regulatory compliance and efficiency; for example, in implementing Single Touch Payroll, the ATO worked closely with digital service providers to ensure that payments could be reported directly from payroll software in a way that met regulatory requirements (ATO 2019, pp. 2–3).

Figure 3.3 – Australia is a hub for regtech companies
Number of regtech headquarters by country, 2020



Source: Wray et al. (2020).

One area with potential for greater diffusion of regtech is workplace relations. Numerous companies already offer payroll software solutions with automated award interpretation; that is, software that automates payroll changes when changes to modern awards occur. The process could be further streamlined, with the Fair Work Commission currently developing an application programming interface — co-designed with software providers, peak bodies and unions — that will enable software providers to connect directly to its modern awards pay database as a ‘source of truth’ on wages and entitlements (Hendry 2022). This would mean that, should the government make future changes to modern awards, it would be easier for software providers to access information about the changes and accurately integrate them into their regtech solutions.



Recommendation 5.12 **Encouraging regtech development and diffusion**

Governments should support greater use of productivity-enhancing regtech by:

- providing regulation in forms that lend themselves to regtech solutions, such as coding regulatory rules into machine-interpretable documents, like the NSW Government's machine-readable version of the *Community Gaming Regulation 2020*. New regulations that are likely to be amenable to a regtech solution should be implemented in a machine-interpretable format at the outset, to avoid the need to go back and codify such regulations in the future
- working with software providers to identify areas where they could improve foundational settings to encourage industry to design compliant regtech solutions. The Fair Work Commission's efforts to develop an application programming interface that enables software providers to directly access its awards database, in co-design with stakeholders, is an example of such an improvement.

Exploiting the special features of knowledge

Much knowledge is like a 'free lunch' hidden in a vault. By its nature, the consumption of knowledge by one person has no effect on the capacity of another person to consume it (knowledge is 'non-rivalrous'). However, while some generators of knowledge cannot prevent others from copying it for free (for example, the *idea* of a smartphone), in many instances, it is feasible to exclude use through contractual provisions like non-disclosure agreements and intellectual property regulations. Some such commercial protections can be justified to the extent that they allow a creator to benefit from, and thereby motivate, their inventiveness.

However, such rights can be overly expansive and destructive to the diffusion of ideas. While some of the concerns relate to diffusion of knowledge that predominantly affects private businesses (like patents), others have a special significance to government-operated or funded activities (like education and social services) and best practice regulation (such as safety regulations).

Access to publicly-funded research

Much of the academic literature funded by governments in Australia is refereed for free, but hidden behind paywalls by journal publishers, diminishing the free flow of ideas at the frontier (PC 2016a, pp. 465–471). This hampers the diffusion (and further creation) of ideas not only to businesses, as discussed in chapter 2, but also to government-funded service providers like clinicians, and public sector organisations like universities, public hospitals, research agencies and many parts of the public service. While official evidence about the parties that use academic research is limited to the business sector, it suggests that industries with significant government funding are the most common users of this important source of ideas (table 3.2). Recommendation 5.3 discussed above in this report could therefore have significant benefits for the public sector, in addition to the potential productivity gains for businesses.

Table 3.2 – Select sources of ideas for the Health Care and Social Assistance Industry
Two years ending 30 June 2021^a

Source of idea/information	Share of entities using this source (%)	Relative use compared with all industries (multiple)	Rank of source among 17 industries
Academic conferences	11.7	4.3	1
Universities or other higher education institutions	17.8	3.3	1
Journals, research papers and publications	11.0	2.9	2
Government agencies	13.2	2.4	2

a. The Health Care and Social Assistance industry includes a mix of private and not-for-profit organisations that are highly regulated by governments and that depend significantly on their funding, such as GPs, aged care, and disability facilities. The table relates to the sources of knowledge that are either directly sourced from the academic literature or where the sources of ideas are themselves likely to depend on access to that literature. For example, among the 17 industry divisions covered by the ABS Business Characteristics Survey, the number two user of ideas from journals, research papers and publications was the Health Care and Social Assistance Industry, with about one in five entities in this industry sourcing ideas from the academic literature, which is a usage rate 2.9 times higher than the all-industries total. The relevant ABS survey excludes public sector enterprises (like public hospitals, universities, the public service and public research institutions) that would have a relatively high level of use academic literature. Accordingly, the table will underestimate the importance of the academic literature to public sector functions.

Source: ABS (*Characteristics of Australian Business*, 2020-21 financial year, Cat. no. 8158.0).

Fair use

Australia also has weak fair use provisions compared with countries like the United States, again potentially stymieing knowledge diffusion in activities run or funded by government — universities, schools, libraries — as well as businesses (PC 2016a, pp. 165–198). There are strong grounds to re-visit fair use provisions, and a fair use exception could be developed and implemented in Australia in a way that complies with international copyright law (PC 2016a, p. 184).

Standards

Standards are widely seen as a major formal mechanism for the codification and diffusion of practical knowledge (Blind, Ramel and Rochell 2022; CIE 2006). Standards can enable the dissemination and coordination of both local and international practices; for example, the Australian Mobile Telecommunications Association observed that having consistent standards in areas such as wireless access supports investment decisions as they ‘ensure support globally by large and small vendors, global economies of scale are leveraged... [and] harmonised deployments between market participants’ (AMTA, sub. 163, p. 8). Moreover, standards are not just relevant to for-profit businesses, with many relating to government-owned and funded organisations (like child, disability and aged care, community organisations) and regulation (such as safety and data rights).

Standards are a perfect example of a non-rivalrous good with high public benefits. Recognising this, some standards are open, as in geospatial data. Many other standards are not. For example, IWA 18 016 is a ‘framework for integrated community-based life-long health and care services in aged societies’ and downloading this from the Standards Australia store costs \$260.06. And Master Builders Australia submitted that:

In the building and construction industry, the prescription of expensive regulatory texts which contain mandatory regulations is made even more frustrating by the practice of referencing a

veritable warren of linked standards which may also need to [be] consulted – and not for free.
(Master Builders Australia, sub. 190, p. 5)

In Australia development of such standards by a not-for-profit entity, Standards Australia, relies on the voluntary engagement of technical committees comprising government, business, community, academic and consumer participants.

Despite the public benefits of standards, they are not free to many users, or if so, the ways in which free access can be obtained may not be obvious. This can entail significant costs for activities where many and changing standards apply. For example, the Australian Competition and Consumer Commission (ACCC) observed that the National Construction Code references over 100 standards that a building and construction business would be required to purchase to understand their legal obligations. It drew a link between the barriers to compliance arising from the costs of access to standards and the major safety incidents that arose from the use of non-conforming combustible aluminium cladding (ACCC 2019, p. 3).

Some standards are mandated in legislation, and some are voluntary. Pricing for the mandated standards risks non-compliance, while pricing for voluntary standards limits the efficient diffusion of knowledge. The arrangements for licensing and paying for Australian standards has been controversial for many years. In the main, this reflected the pricing strategies of a private business that was given exclusive distribution rights for the standards by Standard Australia in the early 2000s. That right ceased in late 2018, but many standards are still sold by Standards Australia to meet its costs.

The ACCC has put forward the view that standards required by legislation should be available at zero charge, while many organisations formally petitioned Parliament in 2022 to abolish any fees. That standards should be free for mandatory standards has merit, given the risks of non-compliance and the fact that many have been developed by government agencies as part of their normal operations. But free or lower-fee provision of voluntary standards would require funding by the Australian Government (and potentially industry associations), and therefore further consideration of optimal funding models.



Recommendation 5.13

No-cost or low-cost access to ideas that have large public good value

To support the diffusion of best practice and knowledge that has already been generated by innovative businesses, not-for-profits and government organisations, the Australian Government should:

- make mandatory standards freely available and look at new funding models for Standards Australia to reduce or eliminate the pricing of voluntary standards that have high public good value
- require open access to research principally funded by governments (see recommendation 5.3 of this report for further detail)
- reform fair use provisions in intellectual property regulations to adopt a principles-based fair use exception.

Appendix

A. Stylised simulations of economy-wide effects

Potential productivity benefits of diffusion²⁹

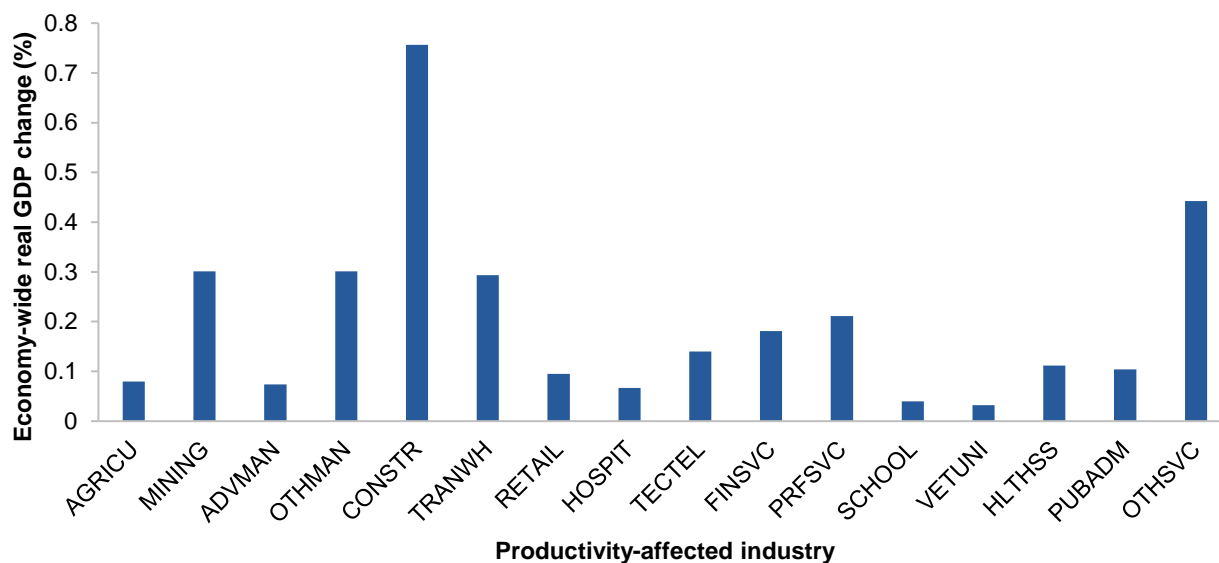
The Productivity Commission used a whole-of-economy model to examine the potential productivity benefits of better diffusion of new ideas, knowledge, business models, technologies, and management capabilities, as well as increased data use. The potential benefits were demonstrated in a stylised manner by simulating scenarios in which all production inputs (labour, capital and intermediate inputs) could be used more efficiently, such that an industry is able to produce 1% more output using the same inputs. This assumption was applied in 16 separate simulations across each of 16 broad industries in the model (excluding the 'ownership of dwellings' industry).

There is a high level of uncertainty in the potential size of productivity improvements arising from the recommendations to improve diffusion in the Australian economy proposed in this report, as well as other model assumptions. As such, the 1% productivity improvement has been simulated for illustrative purposes, so that the simulations can provide insight on how potential productivity improvements could flow through the economy's structure and the differential impacts across the economy. Further details of the model, simulations and effects of sensitivity testing are contained in this inquiry's companion volume *Whole-of-economy modelling*.

Under each simulation, the improved productivity of the affected industry led to a fall in prices of that industry's outputs relative to the economy-wide consumer price index (CPI), as more output could be produced per unit of input. This, in turn, increased demand for that industry's goods from households, government and the rest of the world. Economy-wide, real GDP increased across all simulations, with the size of the increase varying from about 0.03% when the productivity effect was applied to the 'technical, vocational and tertiary education' industry, to 0.76% when applied to the 'construction' industry (figure A.1).³⁰

²⁹ Referred to as simulation 1 in this inquiry's companion volume *Whole-of-economy modelling*.

³⁰ Another way of examining the relative real GDP impacts across simulations is to adjust the economy-wide real GDP effect by the relative change in output for the simulated industry. In doing so, it was found that the shocks to 'construction', 'technology and telecommunications', 'professional, scientific and technical services' and 'other services' industries led to real GDP effects that were proportionally larger than changes in the quantity of outputs produced by those industries. While the 'construction' industry effects were likely largely due to its effect on investment and the capital stock (described below), the outputs of the other industries were among those that were most heavily used as intermediate inputs in the production of goods and services. Therefore, productivity improvements in these industries were better able to flow through to other industries through lowering their production costs, leading to larger economy-wide real GDP effects.

Figure A.1 – Estimated change in real GDP from 16 diffusion simulations^{a,b}

a. Each column represents the economy-wide real GDP change from a separate simulation. **b.** Industry abbreviations: AGRICU – agriculture, forestry and fishing; MINING – mining; ADVMAN – advanced manufacturing; OTHMAN – other manufacturing; CONSTR – construction; TRANWH – transport and wholesale; RETAIL – retail trade; HOSPIT – hospitality; TECTEL – technology and telecommunications; FINSVC – financial services; PRFSVC – professional, scientific and technical services; SCHOOL – school education; VETUNI – technical, vocational and tertiary education; HLTHSS – health and social services; PUBADM – public administration; OTHSVC – other services.

Source: Productivity Commission estimates.

The different economy-wide real GDP impacts across different simulations varied based on two aspects of the economy's structure:

- the size of the industry experiencing the increased diffusion and resulting 1% productivity improvement — increasing the productivity of industries that were a larger share of the economy led to larger GDP impacts.
 - For example, the 'other services'³¹ and 'construction' industries accounted for relatively large shares of economic activity (about 13% and 8% of gross value added, respectively) before the simulation, so simulating a 1% increase in productivity in these industries had larger economy-wide GDP effects in the model.
 - The 'advanced manufacturing' industry, while often a focus of government policy attention, accounted for only 1.5% of gross value added, and as such the economy-wide GDP impact was relatively small after simulating a 1% productivity increase.
- the extent to which the industry's outputs were used in investment — increasing the productivity of industries that were relatively more used in investment supported the growth of the capital stock and led to cheaper rental costs of capital. This, in turn, enabled all industries that use capital to reduce their production costs.

³¹ 'Other services' include energy and utilities, rental and real estate services, administrative and support services, arts and recreation, repair and maintenance, and personal services. These services were grouped together for the model because they were not separately considered to be key industries of interest for the simulation scenarios (companion volume *Whole-of-economy modelling*).

- The investment sector relied most heavily on ‘construction’ commodities, which constituted close to 60% of the total value of investment before the simulation. Simulating increased productivity in the ‘construction’ industry increased the capital stock by 0.9%.
- Non-market services, such as education, ‘public administration’ and ‘health and social services’, were least directly relevant to the investment sector, and are also produced with relatively little capital. The capital stock increased by less than 0.1% when productivity improvements in these industries are simulated.

There were also different effects on labour use in productivity-simulated industries. In some industries, increased productivity led to a fall in labour used by that industry because less labour was required to produce each unit of output, which more than offset the need for more labour arising from increased demand for goods and services (due to the aforementioned relative price falls). In other industries, particularly those for which overseas demand was more responsive to price changes (such as ‘mining’, ‘advanced manufacturing’, ‘other manufacturing’ and ‘technical, vocational and tertiary education’), the increase in demand for these industries’ commodities was large enough to drive an increase in labour used by that industry.

The capital stock increased under all simulations. Although some productivity-simulated industries used less capital in production after the productivity shock, this was more than offset by increased demand for capital from growth in other industries, as well as lower relative prices of investment and capital rental in some scenarios.

The overall wellbeing of households (as measured by a combination of how much they consume and how much leisure they enjoy) increased across all simulations. This was largely due to real wage rates (that is, wages relative to the economy-wide CPI) rising across all age groups, genders and education levels. Other than in the simulations that increased productivity in ‘school education’ and ‘health and social services’, households chose to spend slightly less time on leisure and increased their hours of work (which facilitated an increase in consumption).

While household wellbeing increased in all simulations, the effects were not enjoyed equally across different groups. Industries such as ‘retail’ and ‘hospitality’ tended to employ more younger and lower-educated workers who had lower wage rates. Productivity improvements in these industries led to these industries reducing their use of labour. While this labour was absorbed by other industries, overall real wage rate rises were still smaller for younger and lower-educated workers compared with older and more educated workers, leading to greater consumption inequality. Conversely, productivity improvements in industries such as ‘financial services’ and ‘professional, scientific and technical services’, which tended to employ higher-earning more educated workers, led to a fall in consumption inequality because real wage rises were relatively smaller for these workers than for the younger and lower-educated workers who were more likely to be employed in other industries.

In addition to simulating 16 separate diffusion scenarios across each of the 16 industries in the model, the Commission ran an overall simulation that applied the 1% productivity improvement to all 16 industries at once. Improving productivity in all 16 industries by 1% in a single simulation led to an increase in real GDP of about 3.3% and an increase in real gross national income of about 3.5%. These increases were slightly higher than the combined increases from each separate simulation, due to interaction effects across the economy. Sensitivity testing found that the real GDP increase ranged from about 1.6 to 4.9% across different assumed shock sizes, indicating the uncertainty of effects (chapter 4 of this inquiry’s companion volume *Whole-of-economy modelling*). The overall improvement in household wellbeing was worth about \$1850 per person per year in 2018-19 dollars, and the benefits were more evenly spread across different individual groups, leading to a reduction in consumption inequality.

Abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
ABSF	Australian Business Securitisation Fund
ACCC	Australian Competition and Consumer Commission
ACSQHC	Australian Commission on Safety and Quality in Health Care
AI	Artificial intelligence
APRA	Australian Prudential Regulation Authority
ASIC	Australian Securities and Investments Commission
ATO	Australian Taxation Office
CBA	Cost-benefit analysis
CPI	Consumer price index
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FDI	Foreign direct investment
GDP	Gross domestic product
IHACPA	Independent Hospital and Aged Care Pricing Authority
MBS	Medicare Benefits Schedule
MSAC	Medical Services Advisory Committee
NAPLAN	National Assessment Program – Literacy and Numeracy
OECD	Organisation for Economic Co-operation and Development
PC	Productivity Commission
RTO	Registered training organisation
SME	Small and medium enterprise
STP	Single Touch Payroll
VET	Vocational education and training

References

- ABARES 2022, *Farm Data Portal*, <https://www.agriculture.gov.au/abares/data/farm-data-portal> (accessed 23 August 2022).
- ABS (Australian Bureau of Statistics) 2017, *Management and Organisational Capabilities of Australian Business, 2015-16 financial year*, <https://www.abs.gov.au/statistics/economy/business-indicators/management-and-organisational-capabilities-australian-business/latest-release> (accessed 4 August 2022).
- 2021a, *Australian System of National Accounts, 2020-21 financial year*, Cat. no. 5204.0.
- 2021b, *Employment and Earnings, Public Sector, Australia, 2020-21*, Cat. no. 6248.0.
- 2021c, *Research and Experimental Development, Businesses, Australia, 2019-20*, Cat. no. 8104.0.
- 2022a, *Characteristics of Australian Business, 2020-21*, Cat. no. 8158.
- 2022b, *Government Finance Statistics, Australia, 2020-21*, Cat. no. 5512.
- 2022c, *Innovation in Australian Business, 2020-21 financial year*, <https://www.abs.gov.au/statistics/industry/technology-and-innovation/innovation-australian-business/latest-release> (accessed 5 August 2022).
- 2022d, *Research and Experimental Development, Government and Private Non-Profit Organisations, Australia, 2020-21*, Cat. no. 8109.0.
- 2022e, *Work-Related Training and Adult Learning, Australia, 2020-21 financial year*, Cat. no. 4234.0.
- ACCC (Australian Competition and Consumer Commission) 2019, *ACCC submission to Standards Australia's Discussion paper on the Distribution and Licensing Policy Framework*, 21 August.
- ACIL Allen 2020, *Industry Growth Centres Initiative: Initial Impact Evaluation*, <https://www.industry.gov.au/sites/default/files/2022-11/industry-growth-centres-initiative-initial-impact-evaluation.pdf> (accessed 24 November 2022).
- ACMA (Australian Communications and Media Authority) 2021, *New tech applications for regulatory outcomes: Occasional paper*, 30 March, Commonwealth of Australia, Canberra.
- ACSQHC (Australian Commission on Safety and Quality in Healthcare) 2019, *The state of patient safety and quality in Australian hospitals 2019*.
- 2021a, *AURA 2021: Fourth Australian report on antimicrobial use and resistance in human health*.
- 2021b, *The fourth atlas of healthcare variation 2021 - National summary*.
- 2022, *Condition specific PROMs*, <https://www.safetyandquality.gov.au/our-work/indicators-measurement-and-reporting/patient-reported-outcomes/proms-lists/condition-specific-proms> (accessed 8 September 2022).
- ACTAO (ACT Auditor-General's Office) 2012, *Emergency Department Performance Information*, Performance Audit Report, Report No. 6 / 2012, Canberra.
- AFSA (Australian Financial Security Authority) 2022, *Quarterly Personal Insolvency Statistics, Time Series*, <https://www.afsa.gov.au/statistics/quarterly-personal-insolvency-time-series> (accessed 8 August 2022).
- Agarwal, R., Bajada, C., Brown, P., Moran, I. and Balaguer, A. 2019, *Development of Management Capability Scores*, Research Paper 10/2019, Department of Industry, Innovation and Science, p. 67.
- , Brown, P.J., Green, R., Randhawa, K. and Tan, H. 2014, 'Management practices of Australian manufacturing firms: why are some firms more innovative?', *International Journal of Production Research*, vol. 52, no. 21, pp. 6496–6517.
- Aghion, P., Bloom, N., Blundell, R., Griffith, R. and Howitt, P. 2005, *Competition and Innovation: An Inverted-U Relationship*, NBER Working Papers (9269), 1 May, National Bureau of Economic Research.
- Albury, D. 2005, 'Fostering Innovation in Public Services', *Public Money & Management*, vol. 25, no. 1, pp. 51–56.
- Alesina, A., Harnoss, J. and Rapoport, H. 2013, *Birthplace Diversity and Economic Prosperity*, NBER Working Paper 18699, National Bureau of Economic Research.
- Alston, J.M., Marra, M.C., Pardey, P.G. and Wyatt, T.J. 2000, 'Research returns redux: a meta-analysis of the returns to agricultural R&D', *Australian Journal of Agricultural and Resource Economics*, vol. 44, no. 2, pp. 185–215.
- AMGC (Advanced Manufacturing Growth Centre Limited) 2021, *Annual Report 2020-21*.
- Andrews, D., Criscuolo, C. and Hansell, D. 2019, *The Best versus the Rest: Divergence across Firms during the Global Productivity Slowdown*, CEP Discussion Paper 1645, Centre for Economic Performance, LSE.
- , Hamur, J. and Bahar, E. 2021, *The COVID-19 shock and productivity-enhancing reallocation in Australia: Real-time evidence from Single Touch Payroll*, OECD Economics Department Working Papers, No. 1677, OECD Publishing, Paris.
- , —, Hansell, D. and Wheeler, A. 2022, *Reaching for the stars: Australian firms and the global productivity frontier*, Treasury Working Paper 2022–01.
- , Nicoletti, G. and von Rueden, C. 2020, 'Digital technology diffusion: A matter of capabilities, incentives or both?', *European Economic Review*, vol. 128, p. 103513.
- Andrews, M., Chatterji, A. and Stern, S. 2022, 'Beyond 14 Characters', *The Role of Innovation and Entrepreneurship in Economic Growth*, University of Chicago Press, Massachusetts.
- ANZSOG (Australia and New Zealand School of Government) 2019, *Today's Problems, Yesterday's Toolkit*, Melbourne.
- Apple 2022, *Apple marks 40 years in Australia with new commitments to protect the planet*, Apple Newsroom (Australia), <https://www.apple.com/au/newsroom/2022-08/apple-marks-40-years-in-australia-with-new-commitments-to-protect-the-planet/> (accessed 11 January 2023).
- APRA (Australian Prudential Regulation Authority) 2021, *Response to Submissions: Finalising the Bank Capital Reforms*, November, <https://www.apra.gov.au/sites/default/files/2021-11/Response%20to%20submissions%20>

%20Finalising%20bank%20capital%20reforms.pdf (accessed 24 January 2023).

— 2022, *Revisions to the capital framework for authorised deposit-taking institutions*, <https://www.apra.gov.au/revisions-to-capital-framework-for-authorised-deposit-taking-institutions> (accessed 24 August 2022).

APSC (Australian Public Service Commission) 2021a, *Australian Public Service Commission Census Results 2020-21*, 30 November.

— 2021b, *Mobility fundamentals*, <https://www.apsc.gov.au/initiatives-and-programs/aps-mobility-framework/mobility-fundamentals> (accessed 12 January 2023).

ARC (Australian Research Council) 2018, *Linkage Program — supporting industry-research collaboration*, <https://www.arc.gov.au/overview-arc-grant-opportunities/linkage-program-supporting-industry-research-collaboration> (accessed 25 May 2022).

van Ark, B., O'Mahony, M. and Timmer, M.P. 2008, 'The Productivity Gap between Europe and the United States: Trends and Causes', *Journal of Economic Perspectives*, vol. 22, no. 1, pp. 25–44.

ASBFEO (Australian Small Business and Family Enterprise Ombudsman) 2019, *Review of the R&D Tax Incentive*.

ASIC (Australian Securities and Investments Commission) 2022, *Insolvency statistics - Series 1 Companies entering external administration and controller appointments*.

ATAP (Australian Transport Assessment and Planning) 2018, *Australian Transport Assessment and Planning Guidelines: T2 Cost Benefit Analysis*, May, https://www.atap.gov.au/sites/default/files/t2_cost_benefit_analysis.pdf (accessed 25 November 2022).

ATO (Australian Tax Office) 2019, *Digital service providers: the big picture*, March, <https://www.ato.gov.au/misc/downloads/pdf/qc57215.pdf> (accessed 29 November 2022).

— 2022, *Small business benchmarks*, <https://www.ato.gov.au/Business/Small-business-benchmarks/> (accessed 23 August 2022).

Attrey, A., Leshner, M. and Lomax, C. 2020, *The role of sandboxes in promoting flexibility and innovation in the digital age*, OECD Going Digital Toolkit Notes, No. 2, OECD Publishing, Paris.

Austrade (Australian Trade and Investment Commission) 2021a, *IP Group invests in Australian electrolyser company Hysata*, <https://www.austrade.gov.au/international/invest/investor-updates/2021/ip-group-invests-in-australian-electrolyser-company-hysata> (accessed 5 August 2022).

— 2021b, *Neoen sees a clean, bright future in Australia*, <https://www.austrade.gov.au/news/success-stories/neoen-sees-a-clean-bright-future-in-australia> (accessed 5 August 2022).

— 2021c, *Who invests in Australia? Analysing 2020's \$4 trillion record for foreign investment*, <https://www.austrade.gov.au/news/economic-analysis/who-invests-in-australia-analysing-2020-s-4-trillion-record-for-foreign-investment> (accessed 9 August 2022).

Australian Centre for Business Growth 2018, *Lack of leadership & planning leading cause of small business failure*, 20 November.

Australian Government 2022a, *Defence Strategic Review: Terms of Reference for the Independent Leads of the Review*, <https://www.defence.gov.au/sites/default/files/2022-08/defencestrategicreview-termsreference.pdf> (accessed 21 November 2022).

— 2022b, *Policy Hub: Public Sector Innovation Network*, <https://www.policyhub.gov.au/resources/public-sector-innovation-network> (accessed 26 August 2022).

Bakhtiari, S. 2020, *Market Power and Entrepreneurship Change: the Case for Australia*, Research Paper 2/2020, Department of Industry, Science, Energy and Resources, Commonwealth of Australia.

— and Breunig, R. 2018, 'The role of spillovers in research and development expenditure in Australian industries', *Economics of Innovation and New Technology*, vol. 27, no. 1, pp. 14–38.

BCA (Business Council of Australia) 2010, *Foreign Attraction: Building on Our Advantages through Foreign Investment*, 20 April.

Benchmarking.com.au 2021, *Benchmarking Tools For Australian Businesses*, <https://benchmarking.com.au/> (accessed 23 August 2022).

Bergek, A. 2020, 'Diffusion intermediaries: A taxonomy based on renewable electricity technology in Sweden', *Environmental Innovation and Societal Transitions*, vol. 36, pp. 378–392.

Berlingieri, G., Calligaris, S., Criscuolo, C. and Verhac, R. 2020, *Laggard firms, technology diffusion and its structural and policy determinants*, OECD Science, Technology and Industry Policy Papers, No. 86, OECD Publishing, Paris.

Blind, K., Ramel, F. and Rochell, C. 2022, 'The influence of standards and patents on long-term economic growth', *Journal of Technology Transfer*, vol. 47, no. 4, pp. 979–999.

Bloch, H. and McDonald, J.T. 2001, 'Import competition and labor productivity', Springer, *Journal of Industry, Competition and Trade*, vol. 1, no. 3, pp. 301–319.

Bloom, N., Lemos, R., Sadun, R., Scur, D. and Van Reenen, J. 2014, *The New Empirical Economics of Management*, NBER Working Paper 20102, National Bureau of Economic Research, Cambridge, MA.

—, —, —, — and — 2021, *World Management Survey - Manufacturing*, Harvard Dataverse, <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/OY6CBK> (accessed 8 September 2022).

—, Sadun, R. and Reenen, J.V. 2012, 'Americans do it better: US multinationals and the productivity miracle', *American Economic Review*, vol. 102, no. 1, pp. 167–201.

—, — and Van Reenen, J. 2017, *Management as a Technology?*, NBER Working Paper 22327, National Bureau of Economic Research, Cambridge, MA.

Bloom, N. and Van Reenen, J. 2007, 'Measuring and explaining management practices across firms and countries', *Quarterly Journal of Economics*, vol. 122, no. 4, pp. 1351–1408.

Bloom, N., Van Reenen, J. and Williams, H. 2019, 'A toolkit of policies to promote innovation', *Journal of Economic Perspectives*, vol. 33, no. 3, pp. 163–184.

Bournakis, I., Christopoulos, D. and Mallick, S. 2018, 'Knowledge spillovers and output per worker: An industry-level analysis for OECD countries', *Economic Inquiry*, vol. 56, no. 2, pp. 1028–1046.

Bowman, J. 2022, *Consequences of zombie businesses: Australia's experience*, SSRN Scholarly Paper, 6 April, Australian National University, Canberra.

Breadon, P. 2022, 'Hospital funding deal sets a tight deadline for real reform, and the clock's ticking', *The Conversation*, 17 June.

Brookes, J. 2022, *Chief Scientist plan for free research access for all*, <https://www.innovationaus.com/chief-scientist-plan-for-free-research-access-for-all/> (accessed 15 November 2022).

- Bruno, A. 2020, *Business performance of Enterprise Connect participants*, Staff Research Paper 1/2019, Department of Industry, Science and Resources.
- Business Tax Working Group 2011, *Interim report on the tax treatment of losses*, Commonwealth of Australia, Parkes, ACT.
- Business.gov 2022, *Entrepreneurs' Programme*, <https://business.gov.au/grants-and-programs/entrepreneurs-programme> (accessed 2 September 2022).
- CAANZ (Chartered Accountants Australian and New Zealand) 2021, *CA Catalyst Capability streams*, Text, CAANZ, <http://www.charteredaccountantsanz.com/tools-and-resources/practice-innovation/ca-catalyst-capability-streams> (accessed 2 December 2022).
- Cale, J., Zmudzki, F., Hilferty, F., Lafferty, L., Whitten, T., Doyle, M. and Valentine, K. 2019, *Evaluation of home detention in South Australia: Final report*, UNSW, Sydney, NSW.
- Campbell, S., Nguyen, T., Sibelle, A. and Soriano, F. 2019, *Measuring Productivity Dispersion in Selected Australian Industries*, Treasury–ABS Working Paper 2019-2, Australian Government.
- CHF (Consumers Health Forum of Australia) 2020, *Consumer Commission Report: Making Health Better Together*.
- CIE (Centre for Interantional Economics) 2006, *Standards and the Economy*, Report prepared for Standards Australia, July, Canberra.
- Ciuriak, D. 2013, *Policy implications of heterogeneous firms trade theory*, CC Working Paper, Ciuriak Consulting.
- Cohen, W.M. and Levinthal, D.A. 1989, 'Innovation and learning: the two faces of R&D', *Economic Journal*, vol. 99, no. 397, pp. 569–596.
- and — 1990, 'Absorptive capacity: a new perspective on learning and innovation', *Administrative Science Quarterly*, vol. 35, no. 1, pp. 128–152.
- Commonwealth of Australia 2021, *2021 Intergenerational Report: Australia over the next 40 years*.
- Connolly, E. and Bank, J. 2018, 'Access to small business finance', *Reserve Bank of Australia Bulletin*, September, pp. 1–14.
- Consult Australia 2018, *Model Client Policy: proposal for all government jurisdictions*.
- Crepon, B., Duguet, E. and Mairesse, J. 1998, *Research, Innovation, and Productivity: An Econometric Analysis at the Firm Level*, Working Paper, National Bureau of Economic Research.
- Criscuolo, C., Gal, P., Leidecker, T. and Nicoletti, G. 2021, *The human side of productivity: Uncovering the role of skills and diversity for firm productivity*, OECD Productivity Working Papers, No. 29, OECD Publishing, Paris.
- and Timmis, J. 2017, 'The relationship between global value chains and productivity', *International Productivity Monitor*, vol. 32, pp. 61–83.
- CSIRO 2019, *CSIRO's ON program*, <https://www.csiro.au/en/news/news-releases/2019/csiros-on-accelerator> (accessed 2 September 2022).
- DAE (Deloitte Access Economics) 2015, *Economic benefits of better procurement practices*, Report for Consult Australia.
- DAFF (Department of Agriculture, Fisheries and Forestry) nd, *Agricultural Traceability Grants*, <https://www.agriculture.gov.au/biosecurity-trade/market-access-trade/national-traceability/grantsprogram> (accessed 17 January 2023).
- Dairy Australia 2022, *Dairy Farm Monitor Project*, <https://www.dairyaustralia.com.au/industry-statistics/dairy-farm-monitor-project> (accessed 23 August 2022).
- Darwich, A.S., Polasek, T.M., Aronson, J.K., Ogungbenro, K., Wright, D.F.B., Achour, B., Reny, J.-L., Daali, Y., Eiermann, B., Cook, J., Lesko, L., McLachlan, A.J. and Rostami-Hodjegan, A. 2021, 'Model-informed precision dosing: background, requirements, validation, implementation, and forward trajectory of individualizing drug therapy', *Annual Review of Pharmacology and Toxicology*, vol. 61, no. 36, pp. 225–245.
- De Propriis, L. 2002, 'Types of innovation and inter-firm co-operation', *Entrepreneurship & Regional Development*, vol. 14, no. 4, pp. 337–353.
- Department of Defence 2022, *Portfolio Budget Statements 2022-23: Budget Related Paper No. 1.3A - Defence Portfolio*, March, Commonwealth of Australia, Canberra.
- Department of Jobs, Precincts and Regions and DJPR 2018, *Victorian Innovation Hub launched*, <https://djpr.vic.gov.au/about-us/news/victorian-innovation-hub-launched> (accessed 2 September 2022).
- DESE (Department of Education, Skills and Employment) 2022a, *Higher Education Statistics, 2020 Section 2 All Students*, 14 February.
- 2022b, *JobTrainer Fund*, <https://www.dese.gov.au/skills-reform/jobtrainer-fund> (accessed 6 April 2022).
- 2022c, *Skills and Training Incentive*.
- 2022d, *University Research Commercialisation Action Plan*.
- DIIS (Department of Industry, Innovation and Science) 2017, *Australian Innovation System Report 2017*, Office of the Chief Economist, Department of Industry, Innovation and Science, Canberra.
- 2018, *Statement of Principles for Australian Innovation Precincts*, <https://www.industry.gov.au/data-and-publications/statement-of-principles-for-australian-innovation-precincts> (accessed 2 September 2022).
- 2019a, *Industry Growth Centres Initiative: Progress and Impact*.
- 2019b, *Program Insights: What do we know about government assistance for firms? 2019*, Office of the Chief Economist, Department of Industry, Innovation and Science, Canberra.
- DISR (Department of Industry Science and Resources) 2020, *Use a model, if you know what we mean*, <https://www.industry.gov.au/news/use-a-model-if-you-know-what-we-mean> (accessed 26 August 2022).
- Dobes, L. 2008, *A Century of Australian Cost-Benefit Analysis*, WP 2008–01, Office of Best Practice Regulation, Department of Finance and Deregulation.
- DTI (Department for Trade and Investment) 2020, *Accenture establishes Adelaide Hub*, <https://dti.sa.gov.au/articles/accenture-establishes-adelaide-hub-south-australia> (accessed 5 August 2022).
- Duckett, S. 2017, *Crisis, what crisis: health care funding in the future*, VCCC Forum presentation, July, Grattan Institute.
- Duckett, S. 2018a, 'Expanding the breadth of Medicare: learning from Australia', *Health Economics, Policy and Law*, vol. 13, no. 3–4, pp. 344–368.
- Duckett, S. 2018b, *How the states can keep people out of hospital and still get their fair share of funding*, 29 November, Grattan Institute.

- Eastwood, K., Morgans, A., Smith, K., Hodgkinson, A., Becker, G. and Stoelwinder, J. 2015, 'A novel approach for managing the growing demand for ambulance services by low-acuity patients', *Australian Health Review*, vol. 40, no. 4, pp. 378–384.
- EERC (Education and Employment) 2014, *Effectiveness of the National Assessment Program – Literacy and Numeracy: Final Report*, The Australian Government Senate, Canberra.
- Ellis, L. 2021, 'Innovation and Dynamism in the Post-pandemic World'.
- Ergas, H. 2014, *Submission to the Productivity Commission Inquiry into Public Infrastructure*, Submission No. 87.
- Eriksson, K.B. 2017, *Seeking innovation from the ground up*, PwC, <https://www.pwc.com.au/digitalpulse/seeking-innovation-ground-up.html> (accessed 23 August 2022).
- Fagerberg, J. 2018, 'Innovation: A Guide to the Literature', *Innovation, Economic Development and Policy*, Edward Elgar Publishing, pp. 3–28.
- Ferris, B., Finkel, A. and Fraser, M.J. 2016, *Review of the R&D Tax Incentive*, April 2016.
- First Ministers 2020, *Addendum to National Health Reform Agreement 2020-2025*, May.
- FMRC nd, *Benchmarking*, <https://www.fmrc.com.au/benchmarking/> (accessed 23 August 2022).
- Foley, C. 2021, *Unlocking the academic library: Open Access*, <https://www.chiefscientist.gov.au/news-and-media/unlocking-academic-library-open-access> (accessed 15 November 2022).
- Gahan, P., Adamovic, M., Bevitt, A., Harley, B., Healy, J., Olsen, J. and Theilacker, M. 2016, *Leadership at Work: Do Australian leaders have what it takes?*, University of Melbourne, Melbourne.
- GE Digital 2022, *Aircraft Fuel Efficiency Monitor*, <https://www.ge.com/digital/applications/flight-analytics/fuel-insight> (accessed 23 August 2022).
- Geroski, P.A. 2000, 'Models of technology diffusion', *Research Policy*, vol. 29, no. 4–5, pp. 603–625.
- Giorcelli, M. 2019, 'The long-term effects of management and technology transfers', *American Economic Review*, vol. 109, no. 1, pp. 121–152.
- Gorg, H. and Greenaway, D. 2004, 'Much ado about nothing? Do domestic firms really benefit from foreign direct investment?', *The World Bank Research Observer*, vol. 19, no. 2, pp. 171–197.
- Griffith, R., Redding, S. and Van Reenen, J. 2004, 'Mapping the Two Faces of R&D: Productivity Growth in a Panel of OECD Industries', *Review of Economics and Statistics*, vol. 86, no. 4, pp. 883–895.
- Hall, B. 2004, *Innovation and Diffusion*, NBER Working Paper 10212, National Bureau of Economic Research, Massachusetts, Cambridge.
- Hall, B.H. 2011, *Innovation and Productivity*, NBER Working Paper 17178, National Bureau of Economic Research, Massachusetts, Cambridge.
- Heath Jeffery, R.C., Mukhtar, S.A., Lopez, D., Preen, D.B., McAllister, I.L., Mackey, D.A., Morlet, N., Morgan, W.H. and Chen, F.K. 2021, 'Incidence of Newly Registered Blindness from Age-Related Macular Degeneration in Australia over a 21-Year Period: 1996–2016', *The Asia-Pacific Journal of Ophthalmology*, vol. 10, no. 5, pp. 442–449.
- Hellyer, M. 2022, *Understanding the price of military equipment*, May, Australian Strategic Policy Institute.
- Hemmings, P. and Park, T. 2017, *Creating good conditions for innovation-driven productivity gains in Australia*, OECD Economics Department Working Papers, No. 1390, OECD Publishing, Paris.
- Hendry, J. 2022, *Fair Work is building an API for award pay rates*, iTnews, <https://www.itnews.com.au/news/fair-work-is-building-an-api-for-award-pay-rates-580851> (accessed 29 November 2022).
- McMillan, H., Murray, T., de Fontenay, C. and Lattimore, R. 2022, 'Head in the Cloud: Firm performance and cloud computing', presented at Economic Implications of the Digital Economy Conference, Sydney NSW, Joint conference hosted by the Australian Bureau of Statistics and the Reserve Bank of Australia, March.
- Hiscock, H., Pelly, R., Hua, X., West, S., Tucker, D., Raymundo, C.-M., Dalziel, K., Hiscock, H., Pelly, R., Hua, X., West, S., Tucker, D., Raymundo, C.-M. and Dalziel, K. 2021, 'Survey of paediatric telehealth benefits from the caregiver perspective', *Australian Health Review*, vol. 46, no. 2, pp. 197–203.
- Howard, J. 2022, *The promise was for more industry-focused PhDs. The reality is different*, 25 February, <https://www.innovationaus.com/the-promise-was-for-more-industry-focused-phds-the-reality-is-different/> (accessed 23 August 2022).
- Hughes, A., Kitson, M., Salter, A., Angenendt, D. and Hughes, R. 2021, *The Changing State of Business-University Interactions in the UK 2005–2021*, National Centre for Universities and Business (NCUB).
- Hunter, J., Sonnemann, J. and Joiner, R. 2022, *Making Time for Great Teaching: How Better Government Policy Can Help*, Grattan Institute.
- Hutchings, O. 2021, *RPA Virtual Hospital, A perspective from Sydney, Australia*.
- IA (Infrastructure Australia) 2022, *Delivering Outcomes: A roadmap to improve infrastructure industry productivity and innovation*, March.
- IHPA (Independent Hospital Pricing Authority) 2022, *Consultation Paper on the Pricing Framework for Australian Public Hospital Services 2023-24*, June.
- IMF (International Monetary Fund) 2021, 'Australia: Selected Issues', *IMF Staff Country Reports*, vol. 2021, no. 256, pp. 1–35.
- Infrastructure Australia 2021, *Guide to economic appraisal: Technical guide of the Assessment Framework*, July.
- Invest Victoria 2022, *Melbourne Biomedical Precinct (Parkville)*, <https://www.invest.vic.gov.au/opportunities/precincts/parkville-precinct> (accessed 5 August 2022).
- Investment NSW 2022, *Sydney Startup Hub*, <https://www.investment.nsw.gov.au/living-working-and-business/sydney-startup-hub/> (accessed 2 September 2022).
- IRU (Innovative Research Universities) 2021, *IRU Response University Research Commercialisation Action Plan*.
- ISA (Innovation and Science Australia) 2016, *Performance Review of the Australian Innovation, Science and Research System 2016*, Commonwealth of Australia.
- Janz, N., Lööf, H. and Peters, B. 2004, *Firm Level Innovation and Productivity - Is there a Common Story Across Countries?*, Paper no. 24, Royal Institute of Technology, CESIS - Centre of Excellence for Science and Innovation Studies.
- Javorcik, B.S. 2004, 'Does foreign direct investment increase the productivity of domestic firms? In search of spillovers

- through backward linkages', *American Economic Review*, vol. 94, no. 3, pp. 605–627.
- and Spatareanu, M. 2008, 'To share or not to share: Does local participation matter for spillovers from foreign direct investment?', *Journal of Development Economics*, vol. 85, no. 1–2, pp. 194–217.
- Keller, W. 2021, *Knowledge spillovers, trade, and foreign direct investment*, NBER Working Paper 28739, National Bureau of Economic Research, Massachusetts, Cambridge.
- Kido, Y., Muir, D., Nozaki, M., Wong, Y.C., Zhou, Y.S. and Hlatshwayo, S. 2020, *Why has business investment slowed down in Australia?*, IMF Staff Country Report No. 20/69, March.
- Kiriya, N. 2012, *Trade and Innovation: Synthesis Report*, OECD Trade Policy Papers, No. 135, OECD Publishing, Paris.
- Krugman, P. 1991, *Geography and Trade*, The MIT Press, Cambridge, MA.
- van Leeuwen, K.G., de Rooij, M., Schalekamp, S., van Ginneken, B. and Rutten, M.J.C.M. 2021, 'How does artificial intelligence in radiology improve efficiency and health outcomes?', *Pediatric Radiology*, pp. 1–7.
- Leigh, A. 2018, *Building a better feedback loop: Labor to establish an Evaluator General - Media Release*, https://www.andrewleigh.com/building_a_better_feedback_loop_labor_to_establish_an_evaluator_general_media_release (accessed 12 January 2023).
- 2022, 'Introductory address to staff at the Australian Bureau of Statistics, Canberra', Canberra, ACT, <https://ministers.treasury.gov.au/ministers/andrew-leigh-2022/speeches/introductory-address-staff-australian-bureau-statistics> (accessed 12 January 2023).
- Levine, R. 2005, 'Finance and Growth: Theory and Evidence', in Aghion, P. and Durlauf, S. (eds), *The Handbook of Economic Growth*, vol 1, North-Holland: Elsevier, pp. 865–934.
- Lipscomb, C.A., Youtie, J., Shapira, P., Arora, S. and Krause, A. 2018, 'Evaluating the Impact of Manufacturing Extension Services on Establishment Performance', *Economic Development Quarterly*, vol. 32, no. 1, pp. 29–43.
- Löf, H. and Heshmati, A. 2006, 'On the relationship between innovation and performance: A sensitivity analysis', *Economics of Innovation and New Technology*, vol. 15, no. 4–5, pp. 317–344.
- Ma, S., Murfin, J. and Pratt, R.D. 2021, 'Young Firms, Old Capital', *Journal of Financial Economics*, In Press Corrected Proof.
- Madaleno, M., Nathan, M., Overman, H. and Waights, S. 2022, 'Incubators, accelerators and urban economic development', *Urban Studies*, vol. 59, no. 2, pp. 281–300.
- Majeed, O. and Breunig, R.V. 2021, *Determinants of innovation novelty: Evidence from Australian administrative data*, TTPI-Working Paper 15/2021.
- Markowski, S., Hall, P. and Wylie, R. 2010, *Defence Procurement and Industry Policy: A small country perspective*, Routledge, London.
- Matray, A. 2021, 'The local innovation spillovers of listed firms', *Journal of Financial Economics*, vol. 141, no. 2, pp. 395–412.
- McGaw, B., Loudon, W. and Wyatt-Smith, C. 2020, *NAPLAN Review Final Report*, August, Departments of Education from NSW, Queensland, Victoria and the ACT.
- McIntosh, M. and Prescott, J. 1999, *Report to the Minister for Defence on the Collins Class Submarine and Related Matters*, 20 June, Commonwealth of Australia.
- McKissack, A. and Xu, J. 2016, *Foreign investment into Australia*, 18 February, Treasury.
- McLeod, K., Fabling, R. and Marr, D.C. 2014, *Hiring New Ideas: International Migration and Firm Innovation in New Zealand*, Motu Working Paper No. 14-14.
- Medicare Benefit Schedule Review Taskforce 2020, *An MBS for the 21st Century: Recommendations, Learnings and Ideas for the Future*, Commonwealth of Australia (Department of Health).
- Melitz, M.J. and Redding, S.J. 2021, *Trade and innovation*, NBER Working Paper 28945, National Bureau of Economic Research, Massachusetts, Cambridge.
- MHI (Mitsubishi Heavy Industries) 2020, *MHI to Invest in Green Hydrogen & Green Ammonia in South Australia*, www.mhi.com/news/201126.html (accessed 5 August 2022).
- Mistura, F. and Roulet, C. 2019, *The determinants of Foreign Direct Investment: Do statutory restrictions matter?*, OECD Working Papers on International Investment, No. 2019–01, OECD Publishing, Paris.
- Moffatt, J.J. and Eley, D.S. 2010, 'The reported benefits of telehealth for rural Australians', *Australian Health Review*, vol. 34, no. 3, pp. 276–281.
- Mohnen, P. and Hall, B.H. 2013, 'Innovation and Productivity: An Update', *Eurasian Business Review*, vol. 3, no. 1, pp. 47–65.
- Monash University 2022, *Paid Outside Work Procedure*.
- Mullan, J., Metusela, C., Guppy, M., Pond, D., Ivers, R., Hoffman, R., Rhee, J., Hespe, C.M., Davis, A., Barnett, S. and Bonney, A. 2022, 'Development of a COVID-19 virtual community of practice in New South Wales: A qualitative study', *Australian Journal of General Practice*, vol. 51, no. 4, pp. 263–269.
- MYOB 2022, *The Digital Disconnection Challenge*, June, https://www.myob.com/content/dam/public-website/docs/misc/The%20Digital%20Disconnection%20Challenge_MYOB%20Report%202022.pdf (accessed 22 November 2022).
- Newman, C., Rand, J., Talbot, T. and Tarp, F. 2015, 'Technology transfers, foreign investment and productivity spillovers', *European Economic Review*, vol. 76, pp. 168–187.
- Nooteboom, B. 1994, 'Innovation and diffusion in small firms: Theory and evidence', *Small Business Economics*, vol. 6, no. 5, pp. 327–347.
- Nous Group 2019, *Performance Assessment of the Industry Growth Centres*, Report prepared for the Department of Industry, Innovation and Science.
- NSW PC (NSW Productivity Commission) 2022, *Adaptive NSW: how embracing tech could recharge our prosperity*, November, https://www.productivity.nsw.gov.au/sites/default/files/2022-11/20221117-nsw-productivity-commission_adaptive-nsw_how-embracing-tech-could-recharge-our-prosperity.pdf (accessed 28 November 2022).
- OECD 2015a, *The Innovation Imperative: Contributing to Productivity, Growth and Well-Being*, OECD Publishing, Paris.
- 2015b, *The Future of Productivity*, OECD Publishing, Paris.
- 2017, *Tackling Wasteful Spending on Health*, OECD Publishing, Paris.
- 2018, *OECD 2018 Product Market Regulation Database*, OECD Publishing, Paris.
- 2019a, *The Human Side of Productivity: Setting the Scene*, OECD Publishing, Paris.
- 2019b, *University-Industry Collaboration: New Evidence and Policy Options*, OECD Publishing, Paris.

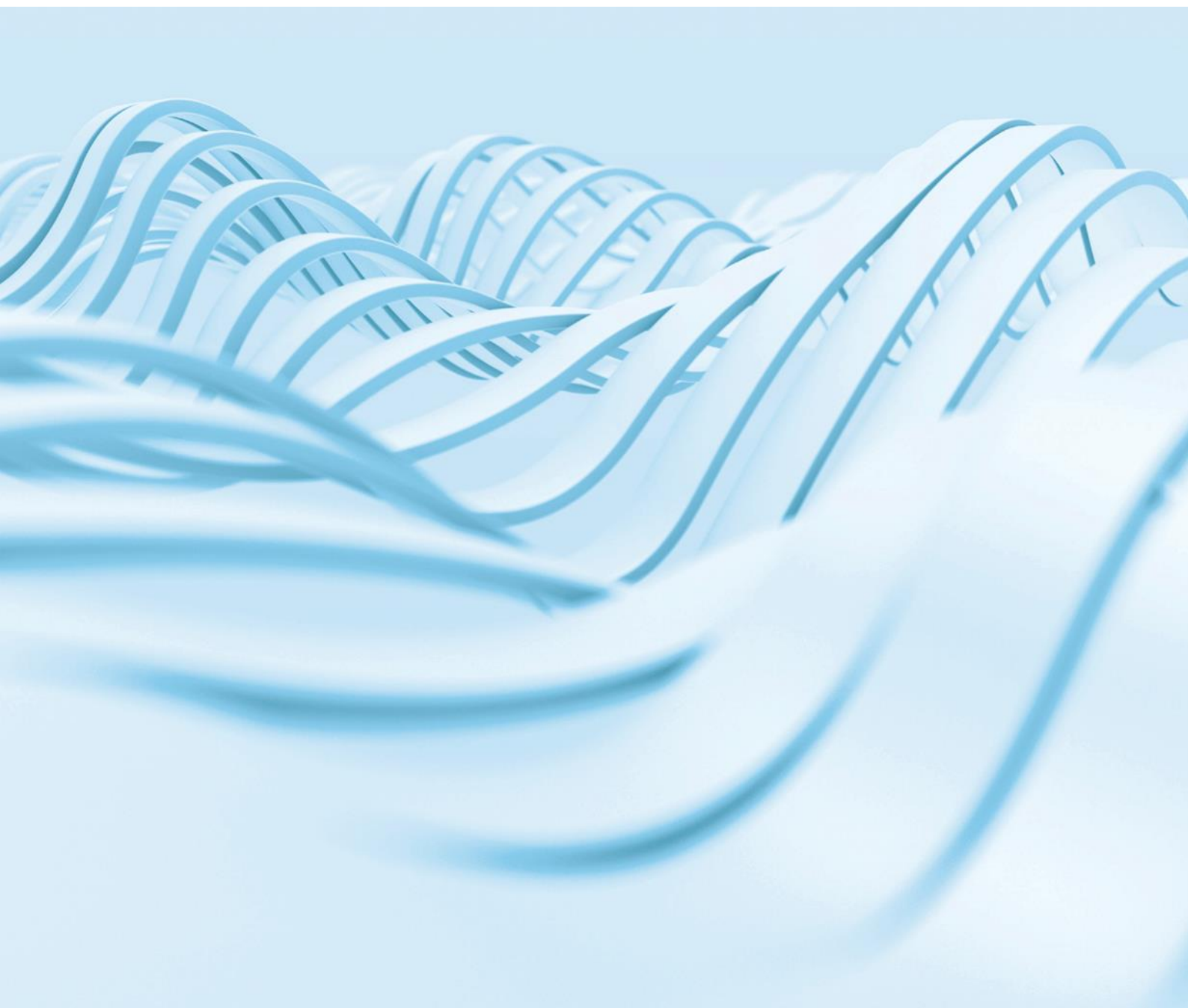
- 2020, *Business innovation statistics and indicators 2019*, OECD Publishing, Paris, <https://www.oecd.org/sti/inno-stats.htm#indicators> (accessed 31 August 2022).
- 2021, *OECD Economic Surveys: Australia 2021*, OECD Economic Surveys, OECD Publishing, Paris.
- 2022a, *Business enterprise R&D expenditure by source of funds and number of persons employed (organisation size class)*, https://stats.oecd.org/Index.aspx?DataSetCode=BERD_SOF_SIZ E (accessed 19 August 2022).
- 2022b, *Business innovation statistics and indicators 2021*, OECD Publishing, Paris.
- 2022c, *OECD FDI Regulatory Restrictiveness Index*, <https://stats.oecd.org/Index.aspx?datasetcode=FDIINDEX> (accessed 22 August 2022).
- OECD/Eurostat 2018, *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation*, 4th edn, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris/Eurostat, Luxembourg.
- Office for National Statistics 2022, *How productive is your business?*, <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/howproductiveisyourbusiness/2018-07-06> (accessed 23 August 2022).
- O'Neill, P., Sohal, A. and Teng, C.W. 2016, 'Quality management approaches and their impact on firms' financial performance – An Australian study', *International Journal of Production Economics*, vol. 171, pp. 381–393.
- PC (Productivity Commission) 2020a, *Indigenous Evaluation Strategy - Background Paper*, Canberra.
- 2011, *Disability Care and Support*, Report no. 54, Canberra.
- 2016a, *Intellectual Property Arrangements*, Report no. 78, Canberra.
- 2016b, *Introducing Competition and Informed User Choice into Human Services: Identifying Sectors for Reform*, Study Report, Canberra.
- 2017a, *An Overview of Innovation Policy*, Shifting the Dial: 5 year Productivity Review, Supporting Paper no. 12.
- 2017b, *Integrated Care: Shifting the Dial: 5 Year Productivity Review - Supporting Paper no. 5*, Report no. 84, Report no. 84, Canberra.
- 2017c, *Introducing Competition and Informed User Choice into Human Services: Reforms to Human Services*, Report no. 85, Canberra.
- 2017d, *Shifting the Dial: 5 Year Productivity Review*, Report no. 84, Canberra.
- 2017e, *Transitioning Regional Economies*, Study Report, Canberra.
- 2018, *Competition in the Australian Financial System*, Report no. 89, Canberra.
- 2019, *Trade and Assistance Review 2017-18*, Annual Report Series.
- 2020b, *Expenditure on Children in the Northern Territory*, Study Report, Canberra.
- 2020c, *Foreign Investment in Australia*, Commission Research Paper, Canberra.
- 2020d, *Indigenous Evaluation Strategy, Background Paper*, Canberra.
- 2020e, *Mental Health*, Report no. 95, Canberra.
- 2020f, *PC Productivity Insights: Australia's long term productivity experience*, Canberra, November.
- 2020g, *PC Productivity Insights: Can Australia be a productivity leader?*, Canberra, March.
- 2020h, *Regulatory Technology*, Information Paper, Canberra.
- 2020i, *Trade and Assistance Review 2018-19*, Annual Report Series.
- 2021a, *Australia's prison dilemma*, Research Paper, Canberra.
- 2021b, *Innovations in Care for Chronic Health Conditions*, Productivity Reform Case Study, Canberra.
- 2021c, *Public Transport Pricing*, Research paper, Canberra.
- 2021d, *Small business access to finance: The evolving lending market*, Canberra.
- 2021e, *Working from home*, Commission Research Paper, Canberra.
- 2022a, *5-year Productivity Inquiry: Australia's data and digital dividend*, Interim Report 2, Canberra, August.
- 2022b, *In need of repair: The National Housing and Homelessness Agreement*, Study Report, Canberra.
- 2022c, *Review of the National School Reform Agreement*, Study report, Canberra, December.
- 2022d, *Submission to the Australian Business Securitisation Fund Review*, Canberra.
- Pearse, J., Mazevska, D., McElduff, P., Stone, C., Tuccia, J., Cho, O., Mitchell, S., McElduff, B., Tran, D., Falster, M., Pearson, S., Jorm, L., Yu, S., Naghsh-Nejadm, M., van Gool, K., Wright, M., Hall, J., Bower, M., Dunbar, J., Henryks, J., Rosen, R. and Smyth, T. 2022, *Health Care Homes trial final evaluation report, Volume 1: Summary report. Health Policy Analysis*, July, Commissioned by the Australian Government of Health.
- Pellegrino, B. and Zingales, L. 2018, *Diagnosing the Italian Disease*, SSRN Scholarly Paper 3057451, 1 July, Rochester, NY.
- Philips 2022, *Future Health Index 2022: Healthcare hits reset: Priorities shift as healthcare leaders navigate a changed world*.
- PMC (Department of Prime Minister and Cabinet) 2019, *Our Public Service Our Future: Independent Review of the Australian Public Service*, Commonwealth of Australia, Canberra.
- PwC Australia, American Chamber of Commerce in Australia, and Australian British Chamber of Commerce 2022, *Maximising Australia's AUKUS opportunity*, <https://www.pwc.com.au/defence/pwc-amcham-abcc-maximising-australias-aukus-opportunity.pdf> (accessed 14 December 2022).
- RBA (Reserve Bank of Australia) 2020, *Financial Stability Review*, October, Sydney.
- Riley, J. 2022, *Labor backs an extended run for Industry Growth Centres*, <https://www.innovationaus.com/labor-backs-an-extended-run-for-industry-growth-centres/> (accessed 26 August 2022).
- Roy, S. 2016, 'Foreign direct investment and total factor productivity growth: does distance from technology frontier matter?', *Global Business and Economics Review*, vol. 18, no. 2, pp. 151–176.
- Sagar, A.D. and Chandra, P. 2004, *Technological Change in the Indian Passenger Car Industry*, BCSIA Discussion Paper 2004-05, Energy Technology Innovation Project, Kennedy School of Government, Harvard University.
- Saia, A., Andrews, D. and Albrizio, S. 2015, *Productivity Spillovers from the Global Frontier and Public Policy: Industry-*

- Level Evidence, OECD Economics Department Working Papers, No. 1238, OECD Publishing, Paris.
- Sargent, J. 2019, *The Manufacturing Extension Partnership Program*, CRS Report R44308, Congressional Research Service.
- Saxenian, A. 1996, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Harvard University Press, Cambridge, MA.
- SBMS (Small Business Mentoring Service) nd, *About SBMS*, <https://www.sbms.org.au/about-sbms.html> (accessed 19 December 2022).
- Service NSW 2022, *Personalised support*, <https://www.service.nsw.gov.au/campaign/covid-19-help-businesses/personalised-support> (accessed 2 September 2022).
- Shaw, L., Jazayeri, D., Kiegaldie, D. and Morris, M.E. 2022, 'Implementation of Virtual Communities of Practice in Healthcare to Improve Capability and Capacity: A 10-Year Scoping Review', *International Journal of Environmental Research and Public Health*, vol. 19, no. 13, p. 7994.
- Shaw, M. and Wilson, A. 2021, *RPA Virtual Hospital: Proof of concept trial Evaluation Report, 2020–2021*, Sydney.
- Sheng, Y., Gray, E., Mullen, J. and Davidson, A. 2011, *Public investment in agricultural R&D and extension: an analysis of the static and dynamic effects on Australian broadacre productivity*, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, September.
- Smith, B. 2021, *The Importance of Benchmarking for the Local Government Sector*, Local Government Professionals Australia, NSW, Sydney.
- Soriano, F. and Abello, R. 2015, 'Modelling the relationships between the use of STEM skills, collaboration, R and D, and innovation among Australian businesses', *Australian Journal of Labour Economics*, vol. 18, no. 3, pp. 345–374.
- Stats NZ 2022, *Business performance benchmarker*, <https://www.stats.govt.nz/experimental/business-performance-benchmarker> (accessed 24 August 2022).
- Stoneman, P. and Diederer, P. 1994, 'Technology Diffusion and Public Policy', *Economic Journal*, vol. 104, no. 425, pp. 918–930.
- Swerissen, H. and Duckett, S. 2018, *Mapping primary care in Australia*, Grattan Institute, Melbourne.
- Terrill, M. 2022, *Roundabouts, overpasses, and carparks: Hauling the federal government back to its proper role in transport projects*, March, Grattan Institute, Melbourne.
- , Burfurd, I. and Fox, L. 2022, *The Grattan truck plan: practical policies for cleaner freight*, Grattan Institute.
- , Emslie, O. and Moran, G. 2020, *The rise of megaprojects: Counting the costs*, November, Grattan Institute, Melbourne.
- Thomson, R. and Webster, E. 2013, 'Innovation and Productivity', *Australian Economic Review*, vol. 46, no. 4, pp. 483–488.
- Tran, M. and Haddock, R. 2021, *Towards a sustainable funding model for telehealth in Australia*, Issues brief 43, Deeble Institute for Health Policy Research.
- Tuhin, R. 2016, *Modelling the relationship between innovation and exporting: Evidence from Australian SMEs*, Office of the Chief Economist Research Paper 3/2016, Department of Industry, Innovation and Science.
- University of Melbourne nd, *Outside Work Procedure (MPF1129)*, <https://policy.unimelb.edu.au/MPF1129> (accessed 9 September 2022).
- University of Queensland nd, *1.50.02 Consultancy, Secondary Employment and Internal Work Policy*, <https://ppl.app.uq.edu.au/content/1.50.02-consultancy-secondary-employment-and-internal-work#Policy> (accessed 9 September 2022).
- University of Sydney 2020, *Sydney University and General Electric to drive Australian manufacturing*, <https://www.sydney.edu.au/news-opinion/news/2020-12/16/sydney-university-and-general-electric-to-drive-australian-manuf.html> (accessed 5 August 2022).
- UWA (University of Western Australia) 2021, *Consultancy Policy*, Policy Number UP21/9.
- VAGO (Victorian Auditor-General's Office) nd, *Reporting on Local Government Performance*, <https://www.audit.vic.gov.au/dashboards/reporting-local-government-performance> (accessed 9 September 2022).
- Vecellio, E., Raban, M. and Westbrook, J. 2012, *Secondary ambulance triage service models and outcomes: A review of the evidence*, Australian Institute of Health Innovation.
- Verreynne, M., Torres de Oliverira, R. and Mention, A.-L. 2021, *Enablers and barriers to industry-research collaboration: A small and medium sized enterprise perspective*, CSIRO.
- Williamson, R.C., Raghnaill, M.N., Douglas, K. and Sanchez, D. 2015, *Technology and Australia's future: New technologies and their role in Australia's security, cultural, democratic, social and economic systems*, Australian Council of Learned Academies.
- WIPO (World Intellectual Property Organization) 2021, *Global Innovation Index 2021: Tackling Innovation through the COVID-19 Crisis*, 14th edition, World Intellectual Property Organization, Geneva.
- Woolner, D. 2001, *Lessons of the Collins Submarine Program for Improved Oversight of Defence Procurement*, Research Paper 3, 2001-02, Parliamentary Library, Canberra.
- World Bank 2021a, *Charges for the use of intellectual property, payments (BoP, current US\$) - Australia*, <https://data.worldbank.org/indicator/BM.GSR.ROYL.CD?locations=AU> (accessed 19 August 2022).
- 2021b, *Charges for the use of intellectual property, receipts (BoP, current US\$) - Australia*, <https://data.worldbank.org/indicator/BX.GSR.ROYL.CD?locations=AU> (accessed 19 August 2022).
- Wray, P., Mackay, W., Loh, I., Young, D. and Ang, Y. 2020, *Australia's Global RegTech Hub Poised for Growth*, BCG Global, <https://www.bcg.com/publications/2020/australia-global-regtech-hub-poised-for-growth> (accessed 29 November 2022).
- WSIPP (Washington State Institute for Public Policy) 2019, *Benefit-Cost Results*, <https://www.wsipp.wa.gov/BenefitCost> (accessed 13 December 2022).
- nd, *Estimating Program Effects Using Effect Sizes*, <https://www.wsipp.wa.gov/TechnicalDocumentation/Overview%20of%20WSIPPs%20Benefit-Cost%20Model.pdf> (accessed 13 December 2022a).
- nd, *Overview of WSIPP's Benefit-Cost Model*, <https://www.wsipp.wa.gov/TechnicalDocumentation/Overview%20of%20WSIPPs%20Benefit-Cost%20Model.pdf> (accessed 13 December 2022b).
- Zou, T., Ertug, G. and George, G. 2018, 'The capacity to innovate: a meta-analysis of absorptive capacity', *Innovation*, vol. 20, no. 2, pp. 87–121.



5-year Productivity Inquiry: Managing the climate transition

Inquiry report – *volume 6*



The Productivity Commission acknowledges the Traditional Owners of Country throughout Australia and their continuing connection to land, waters and community. We pay our respects to their Cultures, Country and Elders past and present.

The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

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ISSN 1447-1337 (online)

ISSN 1447-1329 (print)

ISBN 978-1-74037-759-1 (set)

ISBN 978-1-74037-765-2 (volume 6)

An appropriate reference for this publication is:

Productivity Commission 2023, *5-year Productivity Inquiry: Managing the climate transition*, Vol. 6, Inquiry Report no. 100, Canberra

Publication enquiries:

Media, Publications and Web | phone 03 9653 2244 | email publications@pc.gov.au

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The Commission’s report is divided into 9 volumes: an overview document (volume 1) that presents our policy agenda, and inquiry content volumes (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda, including a modelling appendix. The full report is available from www.pc.gov.au.

Preface

Australia's contribution to global decarbonisation efforts, and our need to adapt to a changing climate, will inevitably bring costs, uncertainties and opportunities. Policy settings will be critical for promoting least-cost pathways and providing the capacity and the flexibility to manage risks and harness opportunities.

Decades of competing approaches to climate policy have left Australia with a hodgepodge of narrowly applied, sometimes inconsistent sectoral abatement measures that not only impose an unnecessarily high cost on the community but often are ineffective in achieving abatement. Investments in key sectors like electricity generation have been delayed and distorted by the lack of clear policy direction.

The economic costs of this approach are increasingly apparent: laying bare the reality that decisions to avoid technology 'neutral' economy-wide abatement mechanisms do not avoid the pricing of emissions — they only lead to a myriad of very high implicit or 'shadow' emissions prices.

Pursuing a least-cost approach to net zero emissions and adapting to a changing climate will be a key productivity challenge for Australia. With climate-related investments over coming decades to be measured in the tens and hundreds of billions of dollars, policy settings that distort even a small proportion of this investment will significantly impact our productivity growth performance over the decades ahead.

This volume seeks to identify a path from existing policy settings to a sustainable climate policy architecture for Australia — that is, one that provides greater certainty, clarity and enduring support for efficient abatement and adaptation decisions over the decades ahead.

This includes progressively recalibrating the Safeguard Mechanism to become Australia's principal economy-wide mechanism for achieving national abatement targets. Among other things this will entail taking steps to strengthen the integrity of recognised emissions offsets, expanding sectoral coverage, allowing the transfer of emissions rights within and between covered sectors and phasing out other abatement policies that are not complementary to it.

Efficient adaptation to the effects of climate change will require giving individuals, households and businesses the information they need to make decisions in their own interests to adapt to a changing climate and avoiding policy settings that inadvertently constrain those decisions.

1. Managing the climate transition

Key points

- * **Climate change looms large over Australia's productivity performance. Its potential physical impacts, and the policy steps taken in response, will affect Australia's productivity growth over coming decades.**
 - Climate change is expected to directly impact productivity in agriculture, fisheries, tourism and in those sectors that rely on physical labour in heat-exposed environments.
 - Alongside these expected physical impacts, policy efforts to contain the costs of climate change, by both reducing emissions and by adapting to a changing climate, will also impose costs.
 - Climate policies of the world's major economies risk reducing demand for key Australian exports.
- * **A key productivity challenge will be achieving our 2030 and 2050 emissions reduction targets as efficiently as possible. Continued reliance on a suite of ad hoc sectoral policy measures will unnecessarily reduce productivity growth and living standards. Economy-wide settings that create enduring incentives for credible abatement could achieve our emissions targets at lower cost.**
- * **The centrepiece of Australia's abatement policy should be a Safeguard Mechanism (SM) that (i) is broadened to include the electricity sector at the facility (rather than sector) level and the transport sector; (ii) includes lower greenhouse gas emission thresholds, to increase the range of facilities captured by the SM; and (iii) lets facilities earn credits for abatement below their baselines.**
- * **Abatement policies outside the Safeguard Mechanism framework should show how they are complementary to it and have their implicit carbon abatement costs independently estimated and made public. Policies found not to be complementary should be phased out.**
- * **Public support for R&D into new technologies stands to be complementary to an expanded SM. But with an economy-wide incentive in place, the case for public support will be strongest in the case of frontier technologies where market failures are most apparent, though risks will need to be managed.**
- * **Improving the integrity of offsets will be needed to achieve real emissions reductions through an expanded Safeguard Mechanism, including tighter requirements to ensure additionality, permanence and transparency of abatement projects that generate Australian Carbon Credit Units.**
- * **Managing the intermittence challenges of an increasingly renewable electricity grid should move back over time toward relying principally on price movements in wholesale electricity markets to balance electricity supply and demand. The Capacity Investment Scheme should be subject to a 5-year sunset clause and would better support supply reliability if technology-neutral.**
- * **Adaptation policy should support individual, household and business decisions about what regions, sectors, and occupations they are best placed to transition into. Governments have a role in helping people make informed adaptation decisions and should avoid policy settings that inadvertently constrain them.**

Climate change looms large over Australia's productivity performance over coming decades. Its physical impacts, and the international and domestic policy steps taken to limit them, will affect productivity growth. The physical impacts of climate change stand to be profound (chapter 2) and will directly constrain productivity growth in sectors that are important to Australia, including agriculture, fisheries, tourism and sectors that rely on the exertion of physical labour in heat-exposed settings (box 2.1).

Alongside these impacts, policy efforts to contain the costs of climate change, either by reducing emissions or by adapting to a changing climate, will also affect productivity growth. Efficient adaptation measures would improve productivity growth, relative to what would otherwise be the case, by mitigating the economic impacts of a changing climate. Some individual emissions abatement measures, such as a distributed renewable electricity grid that is less exposed to disruptive international energy price volatility, may prove to have a long-run positive impact on productivity. But abatement measures will generally increase the direct costs of production and thereby weigh on measured productivity growth. These costs are being incurred as part of Australia's contribution to the international effort to reduce the unmitigated economic, environmental and social costs of climate change, likely benefiting all countries including Australia.

In this way, the productivity impacts of higher production costs can be viewed as the price of reducing the chance of even greater climate-related productivity costs in the future. Global emissions abatement policy should be viewed as a global cost-minimisation exercise, and sound domestic climate policy should be viewed as a part of Australia's contribution to that collective effort. Given Australia's commitment to this collective effort, a key policy challenge will be ensuring that the productivity costs of our emissions reduction actions are kept as low as possible. This will maximise our flexibility as we contend with dynamic climate challenges over coming decades and will help to increase the likelihood that the benefits we derive from global action to address climate change will outweigh any cost to Australian living standards.



Finding 6.1

Sound climate policy represents a part of Australia's contribution to global efforts to contain the long-run costs of climate change

Having committed to achieve net zero greenhouse gas emissions by 2050, and an interim target of 43% below 2005 emissions levels by 2030, the economic costs of that contribution to global abatement would be minimised by taking a principles-based, least-cost approach to emissions reductions. This would be complemented by multilateral oversight of the contributions of other nations.

2. Physical impacts

The average temperature of the Earth has increased by 1.1 degrees celsius since the industrial revolution. This warming has flowed from an increase in the stock of heat trapping greenhouse gases in the atmosphere, from about 280 parts per million of CO₂ prior to the industrial revolution, to 414.4 parts per million of CO₂ in 2021 (CSIRO and BOM 2022, p. 3).

The increase in atmospheric greenhouse gases has come from: the release of geological stores of carbon due to coal, oil and natural gas combustion; the release of terrestrial stores of carbon (forests, soil, peat) from deforestation for agriculture and human settlements, and the increased production of methane from the agriculture-related increase in ruminant livestock populations; and the anaerobic decomposition of waste.

It is important to distinguish between annual emissions and the stock of greenhouse gases in the atmosphere. The former are flows, the latter are stocks. The lag between a given increase in the stock of greenhouse gases in the atmosphere and the subsequent increase in the average global temperature means that, even if the world achieved net zero emissions tomorrow, an additional 0.3–1.7 degrees of global warming is estimated to be already 'locked in' (Zhou et al. 2021). As a result, Australia will have to prepare for at least some degree of additional warming, regardless of the speed of global emissions abatement over coming decades. That is, global emissions abatement will be necessary to avoid the worst effects of global warming, but it will not avoid warming entirely.

This 'locked-in' warming is expected to continue to drive structural shifts in the Earth's natural resource systems, which will reduce the availability of some resources, increase the availability of others, and alter their distribution between and within countries. For example, rising temperatures are projected to:

- reduce the availability of land as the melting of land-based ice and the thermal expansion of liquid water drive sea-level rise
- alter the geographical distribution of rainfall, with some regions experiencing increased rainfall while others experience decreased rainfall
- alter the temporal distribution of rainfall, with potentially higher peaks in rainfall at particular points in time
- exceed habitable ranges for some plant and animal species, threatening the viability and productivity of some crops, and the broader ecosystems that agriculture relies upon
- increase the geographical range of pests and diseases that can harm human agricultural production and productivity
- increase the frequency of days with temperature and humidity levels that are hazardous to human health ('wet bulb days')
- increase the geographical range of tropical diseases, and threaten to release pathogens frozen in tundra, to the potential detriment of human and animal health
- increase the frequency and severity of bush and forest fires
- weaken global ocean currents, which combined with increased ocean acidification and deoxygenation, is projected to threaten the viability of some marine species.

Some of these physical impacts have already affected Australia and are projected to continue doing so (box 2.1).

Box 2.1 – Physical climate impacts on key Australian industries

Climate impacts that will be particularly important for Australia include a reduction in agricultural productivity in some regions, as temperature and humidity levels move beyond habitable ranges for some crops. For example, Ortiz-Bobea et al. (2021) estimate that global warming has already decreased global agricultural productivity by 21% since 1961, relative to what would otherwise be the case. Hochman, Gobbett and Horan (2017) estimate that climate change has reduced Australian wheat yields by about 27% since 1990, and Hughes et al. (2022) estimate that climate change over the last 20 years has reduced average Australian farm profits by 23%.

For Australian fisheries, ocean deoxygenation, increases in ocean temperature and increased ocean acidification are likely to push marine environments beyond the habitable range for some species, weakening broader ecosystems in the process. CSIRO (2021) estimates that 70% of key species in Australian fisheries are moderately to highly sensitive to climate change over coming decades.

Ongoing warming also risks degrading Australia's stock of physical capital. Mallon et al. (2019) assessed the degree of climate risk (riverine flooding, coastal inundation, bushfire, subsidence and wind risk) facing 15 million addresses in 544 Australian local government areas between 2020 and 2100, based on topography, biomass coverage, meteorological patterns and climate projections out to 2100. The authors classified 383 300 addresses as high-risk properties and projected that number to increase to 735 654 by 2100, warning that ongoing development ... 'in high hazard areas or continued use of inadequate building standards ... will substantially increase this number' (ibid, p. 5).

Perhaps the most direct way in which Australians will experience the physical impacts of climate change is through a rise in average daily temperatures, and an associated increase in the number of 'extreme heat' days over the course of the year. The number of extreme heat days that occur each year (days where the average daily temperature is in the warmest 1% of days for each month, measured over the period 1910 to 2019) has grown from 1 in 1910 to more than 40 in 2019, and is projected to continue rising as global warming continues (CSIRO 2020, p. 4). Public awareness of the phenomenon of 'wet bulb days', where temperature and humidity levels exceed the threshold beyond which the human body can cool itself, will grow over the decades ahead. Extreme heat has already been responsible for more deaths in Australia than any other natural hazard. Sectors that have been identified as being particularly exposed to rising temperatures include those reliant on:

- outdoor workers such as construction, agriculture, gardening and landscaping, emergency services, and professional sports
- indoor workers exposed to heat-radiating equipment such as manufacturing, laundries, and professional kitchens (Humphrys et al 2020).

3. Promoting efficient adaptation

Within the evolving environment, an adaptation policy that seeks to promote productivity growth should focus on helping individuals, households and businesses make informed adaptation decisions; and avoid policy settings that inadvertently constrain them.

The vast majority of adaptation-related decisions will be made by individuals, households and businesses in the natural course of their future planning. Individuals are the primary decision makers about which sectors they will work in, households are the primary decision makers about which regions they will live in and businesses are constantly making judgements about the likely course of consumer preferences and the business environments they will likely face in the future, when choosing which goods and services to produce and how to produce them.

3.1 Helping to promote informed adaptation decisions

As a trusted provider of information, and important funder of research, governments are well placed to help inform household and business level adaptation decisions. This is already occurring in a number of helpful ways. The CSIRO and the Bureau of Meteorology publish a biennial *State of the Climate Report* that tracks Australian climate developments and provides updated climate projections every two years. This resource is included on the *Climate Change in Australia* website, which acts as a single source for a wide range of national and regional climate projection information and tools designed to help individuals, households, businesses and governments plan for the decades ahead. Diverse and targeted approaches to the dissemination of climate impact information to households and businesses would be supported through developments such as smartphone applications to provide site specific climate projections for farmers, fisheries managers, town planners and other businesses and professions.

The compulsory disclosure of climate risks, particularly where competing interests preclude the voluntary provision of such information, may be warranted in some cases. The pre-sale disclosure of the climate-related exposures of individual residential and commercial properties is a clear candidate. Mandatory disclosure of the climate-related risks facing a property — such as the likelihood of coastal inundation, riverine flooding, subsidence, destructive winds, bushfire and other natural disasters — would help potential buyers of a property make more informed decisions. Such analysis is already available and could be provided cost-effectively. However, the risk of subsequent reductions in the values of particularly climate-exposed properties might preclude voluntary disclosure by existing owners, and a general lack of awareness may prevent potential buyers from seeking it. Compulsory disclosure could also limit the degree to which government is called upon to become an insurer of last resort for particularly exposed properties, first by making these exposures clear to potential buyers, and second by helping private insurance companies to more accurately price climate risk (box 3.1).

Box 3.1 – Private insurance markets and climate change

Australian natural disaster-related insurance claims rose notably between 2005 and 2022, from an annual average of \$1.5 billion to \$3 billion in real terms over the period. Some have partly attributed this rise to the early effects of climate change. A continuation of this trend would see insurance claim values quadruple in real terms between 2022 and 2050 (Reinhard and Lefebvre 2022, p. 19).

The Insurance Council of Australia has claimed that ‘at present no region in Australia is uninsurable, however worsening extreme weather events are driving up premiums in parts of the country most exposed to extreme weather risk and rendering insurance unaffordable for some’ (ICA 2022). Relative changes in insurance premiums play an important systemic role in helping households and businesses understand the climate risks that they face. While rising premiums are undesirable for individual households and businesses, they will be able to identify when high insurance premiums render unviable a proposed investment (either the addition to an existing structure or development of a new structure), or more generally reduce an investment’s commercial feasibility.

Increasingly detailed climate projections will be important in helping insurers accurately price climate risks over the years ahead. An inability to accurately price physical climate risks may lead private insurers to stop offering insurance products that cover the effects of particular climate events in particular regions altogether, being unable to judge whether they are taking on an acceptable level of risk.

The retreat of private insurers from particular regions or activities will weigh on productivity growth, by removing one of the mechanisms by which people are able to assess and manage risk, and will leave governments vulnerable to becoming insurers of last resort for any under-insured activity that remains. The 1 July 2022 commencement of the Northern Australia Reinsurance Pool risks falling into this category. However, subsequent government interventions in private insurance markets should be avoided. Subsidising insurance premiums risks distorting investment decisions to the detriment of productivity growth, and inadvertently encouraging communities to make decisions that can increase the costs of future climate events.



Recommendation 6.1

Avoid government subsidised insurance schemes

Australian governments should avoid expansion of climate-related insurance sector interventions and set a medium-term time frame for the phase out of the Northern Australia Reinsurance Pool. Government interventions in private insurance markets risk subsidising the movement of individuals, households, and businesses into harm’s way, and increasing overall adaptation costs. Setting a medium-term time frame for the phase out of the Northern Australia Reinsurance Pool would provide time for private insurance providers to secure alternative reinsurance services.

3.2 Avoiding policies that discourage private adaptation decisions

Policy settings that distort private transitions — such that households and businesses transition toward more climate-exposed activities — will increase adaptation costs over time. The adverse effects of such policy settings may be direct or indirect. Direct effect policy settings may prevent individuals and businesses from transitioning into new activities. For example: unduly restrictive occupational licensing can constrain the movement of labour between different occupations and sectors (see volume 7); ‘just-transition’ inspired enterprise agreements can constrain business transitions towards alternative product markets (see volume 7); and foreign investment constraints can limit the pursuit of new opportunities, while protecting incumbent industries that fail to pursue them (see volume 3). Indirect effect policy settings can include industry assistance and transfer system settings that impose high effective marginal tax rates on movement between activities. It was partly on these grounds that the Commission previously recommended reforming Australia’s approach to drought assistance (PC 2009).

Economy-wide policy settings, such as household income assistance provided through the transfer system, are generally preferable to sector-specific transitional assistance. Nevertheless, calls for sector-specific assistance are likely to emerge where climate-affected industries comprise a large proportion of a local or regional economy. In such scenarios, policy makers should guard against providing enduring assistance to increasingly unviable activities and regions. Doing so risks impeding adaptation-related transitions away from those activities and regions, raising long-run adaptation costs, and weighing on productivity growth in the process. Assistance that supports productivity is generally neutral across sectors — allowing individuals, households and businesses to make their own judgements about which sectors, and regions, they are best placed to transition into. For this reason, any transitional assistance package provided by governments should not be made conditional on recipients committing to a particular region, sector or occupation.

Public investments aimed at sheltering incumbent businesses and population centres from climate impacts, such as building sea walls to defend towns against coastal inundation; investments in irrigation infrastructure to defend agricultural regions from shifting rainfall patterns; and building or raising dam walls to defend businesses and households from riverine flooding, can risk locking in higher future adaptation costs. Such responses are less likely to pass rigorous cost-benefit assessments in at least four scenarios:

- **where the investment is likely to be insufficient to defend against all relevant climate impacts** — this could occur when an industry faces multiple climate-related challenges, but infrastructure investment is only capable of addressing one of them. For example, investment in increased water supply might help address growing water availability concerns in some regions, but it may prove ultimately ineffective if temperature rises in these regions, and an increase in the geographical range of pests and disease, push the region beyond the habitable range for key crops
- **where the cost of that investment negates or undermines the comparative advantage of an industry** — when infrastructure investments are capable of addressing all climate-related challenges but the costs of doing so negate or undermine the comparative advantage that the industry once enjoyed
- **where the infrastructure investment inadvertently encourages excessive risk taking** — building infrastructure to defend an existing area from climate impacts can encourage excessive risk taking in the area, potentially negating the overall value of the investment. This might be the case where the building of dams, or the raising of existing dam walls, to defend a valley from flooding encourages further residential and commercial development in that valley, raising the expected future cost of remaining flood risk
- **where the building of new facilities and population centres in other areas would be more cost-effective** — when the infrastructure investments required to defend existing capital exceed the cost

of rebuilding this in an area that is less-prone to climate risks. For example, it might be that the costs of rebuilding part of a town on higher ground (including the transitional and social costs associated with the relocation) are less than the cost of building a system of sea walls to defend an existing coastal town from rising sea levels. Rigorous cost-benefit analyses that consider the broad range of costs and benefits (including cultural, social and environmental values) of defending existing centres relative to relocating those centres, can help inform these decisions.

Appropriate risk allocation and the potential for moral hazard will be important considerations for new development in areas vulnerable to rising sea levels, riverine flooding, bushfire and extreme weather events. Some of these risks will impact communities periodically, such as riverine flooding, bushfires and extreme weather events. Others will be more permanent, such as rising sea levels. Whether new developments should be allowed to go ahead in those areas particularly exposed to future climate impacts is ultimately a question of 'acceptable risk.' While markets will play a key role in allocating risk efficiently, questions of acceptable risk, and the social desirability of alternative risk mitigation measures, are often a collective choice, communicated through democratic processes.

However, a move towards cost-reflective pricing of developments in such areas could help to avoid inadvertently placing businesses and households in harm's way. For example, incorporating the cost of risk reduction measures into the cost of new developments on coastal plains vulnerable to sea level rise (e.g sea walls) could help to optimise risk management within the development as a whole and ensure that remaining climate risks were borne knowingly. The approval of defensive infrastructure should be subject to broader social acceptance of its external costs, such as loss of amenity for neighbouring communities or reduced accessibility to public lands.

Imposing developer levies to fund climate risk reduction measures is one way of moving new developments towards cost-reflective pricing. Similarly, ensuring that the cost of emergency responses services, like fire services in bushfire prone area, are incorporated into local council rates would support cost-reflective pricing.

Nevertheless, even with risk mitigation measures in place, climate impacts will still occur. While such risks are best managed through private insurance markets, it is plausible that private insurers will progressively retreat from these markets as climate impact risks increasingly manifest over time (box 3.1). To ensure that Commonwealth and State Governments do not inadvertently and unnecessarily become insurers of last resort, additional developer levies could be used to finance local funds, designed to cover future shortfalls in private insurance coverage.



Recommendation 6.2 **Helping to inform adaptation investment decisions**

Households and businesses should be provided with the information they need to make informed adaptation decisions. State and Territory governments should mandate the pre-sale disclosure of climate risks for all residential and commercial property sales.

- Such disclosure should be based on existing climate change projections and cover a range of physical risks including riverine flooding, sea level rise, subsidence, fire and other natural disasters.
- This disclosure could operate in the same way that States and Territories mandate the pre-sale disclosure of building reports.

For new greenfield developments, the cost of climate risk reduction measures should be incorporated into the price of buying into the new development, through mechanisms like developer levies, which will help ensure that future residents face cost-reflective pricing.

Community relocations and adaptation-related infrastructure

There will likely be cases where least-cost adaptation policy supports the defence of existing developments. However, the desirability of relocating some particularly climate-exposed communities will be increasingly debated over coming years. For example, climate change is estimated to increase the severity of rainfall, and subsequent flooding, of particular regions. This reflects the increased ability of the atmosphere to hold moisture, subsequently released as heavier rainfall, as the atmosphere warms. Communities that were previously assessed to be subject to '1-in-100-year' weather events may now be subject to such events on a more frequent basis (Visser et al. 2022). The same will likely be true for communities exposed to bushfire (Canadell et al. 2021), cyclones (Bruyere et al. 2022) and rising sea levels (Hague et al. 2022).

In such regions, automatically rebuilding communities impacted by natural disasters could inadvertently bring a greater level of risk than might be acceptable in greenfield developments, place communities at a greater level of risk than might be commonly appreciated and drive capital misallocation over time, raising long-run adaptation costs, and weighing on productivity growth in the process. Ensuring that planning approval processes are updated to incorporate the latest available climate projections will be part of the answer. Another part will be undertaking cost-benefit analysis that factors in the future likelihood of natural disasters based on climate projections for the region and that considers the broad range of costs and benefits (cultural, environmental and economic) of rebuilding in-situ with more stringent increased building standards and community-wide defensive infrastructure, relative to rebuilding in less climate-exposed areas.

As a general principle, if the decision is taken to relocate a community, it is those levels of government responsible for the initial approval of these developments that should be responsible for the costs of their relocation. This will generally be State, Territory and Local Governments, who control land use planning and land registries. Deviations from this principle, such as calls for the Commonwealth Government to fund future community relocations in situations where the Commonwealth did not have policy responsibility for the establishment of those communities, risks creating moral hazard issues in State, Territory and Local Government planning systems. Calls for Commonwealth financial assistance to State Governments are often justified on the grounds of the greater financial capacity of the Commonwealth. However, questions of appropriate cost allocation are best resolved by consideration of responsibility for the policy area in question, not which level of government has the greatest access to financial resources. Moreover, such calls often overlook the various tax bases available to other levels of government, their ability to access public debt markets, and existing Commonwealth transfers to other levels of government.



Recommendation 6.3

Transitional assistance should not distort adaptation decisions

If transitional assistance is provided to climate-impacted regions, industries, and workers, it should be structured in a way that lets people decide which regions, sectors, and occupations they are best placed to transition into. It should not be made conditional on recipients committing to live or work in a particular region, sector, or occupation.



Recommendation 6.4

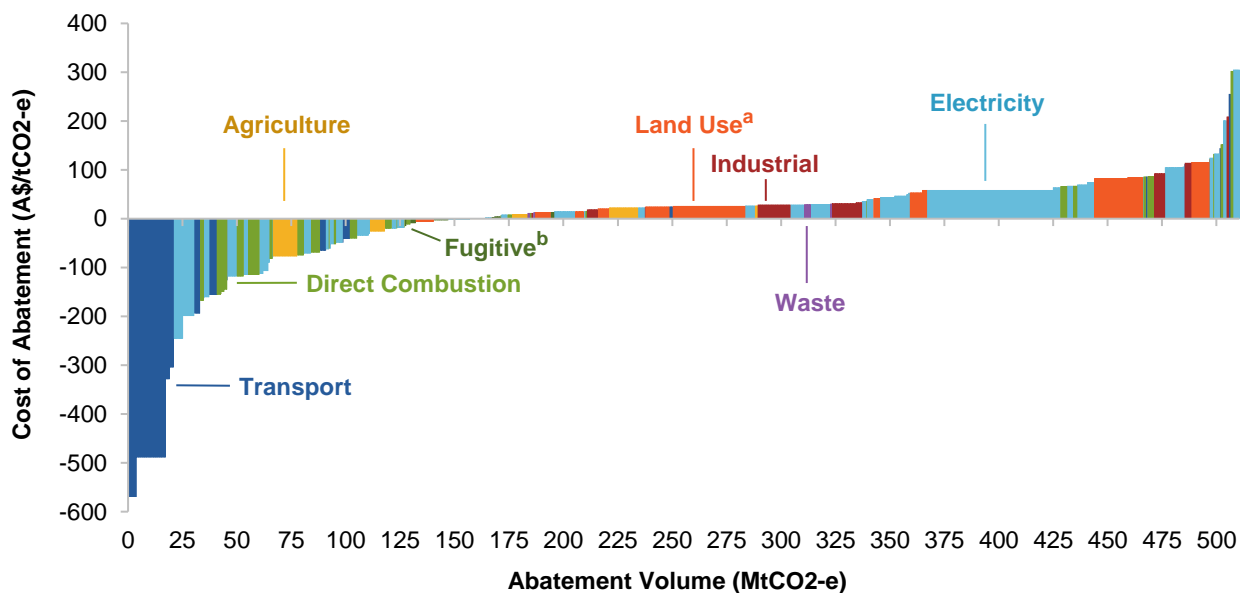
Cost-benefit analysis for adaptation-related infrastructure projects

Proposed adaptation-related infrastructure projects (including projects to rebuild or relocate communities impacted by large scale natural disasters) should be subject to rigorous cost-benefit analysis that incorporates plausible climate projections over the projected life of the asset and compared with that of alternative options. In the case of community rebuilding proposals, a rigorous cost-benefit analysis would consider the broad range of costs and benefits – cultural, social, economic, and environmental – of rebuilding in-situ with increased defensive measures, relative to rebuilding in an alternative location.

4. Productivity-enabling emissions reductions

The Australian Government has set a national greenhouse gas emissions reduction target of 100% (in net terms) by 2050, and an interim target of 43% below 2005 emissions levels by 2030. These targets constitute Australia's Nationally Determined Contribution to the Paris Agreement, the global treaty that seeks to limit global warming to 1.5 degrees by the end of the century. The question now facing policy makers is how best to achieve these targets. Achieving these targets at least-cost will increase the likelihood that emissions reductions prove a net positive for Australian productivity growth, relative to a world of avoidable climate change. While acknowledging the uncertainty around technology costs and new technologies, a least-cost approach to emissions abatement requires pursuing abatement options broadly in line with prevailing estimates of Australia's marginal cost of abatement curve — starting with low (or even negative) cost abatement options before pursuing higher cost options in later years (figure 4.1).

Figure 4.1 – Australia's projected marginal cost of abatement curve, 2030



a. 'Land use' includes land use change and forestry. b. Fugitive emissions are emissions associated with production of natural gas, oil and coal.

Source: Reputex Energy (2019).

Leaving higher cost abatement options to the later years of Australia's decarbonisation journey would give time for ongoing technological developments to lower the long end of our emissions abatement cost curve, reducing the cost of currently high cost abatement options before they are required to be pursued. However, even with ongoing technological gains it might be that some long-run domestic abatement costs remain

higher than so-called offsets generated by 'negative emissions' technologies (box 4.1), the use of which would allow for the achievement of net zero emissions even while some gross emission sources remain.

Box 4.1 – The role of 'offsets' and negative emissions in a net zero world

Offsets can help businesses, and countries, to achieve 'net zero' emissions even when they find it too costly to eliminate all emissions sources. For example, an individual mining business could achieve net zero emissions by reducing their (gross) emissions as much as is cost effective (by, say, 70%) and then paying another business, say a commercial property fund, to install enough solar panels to 'offset' the remaining 30% of the mining company's gross emissions.

However, this example would not be possible in a country that was operating at net zero emissions. In a net zero emissions country, both the mining company and the commercial property fund would need to achieve net zero emissions, leaving the commercial property fund unable to produce a legitimate offset. The mining company could notionally find an overseas commercial property fund to produce an offset, but this option would be similarly unavailable if the world as a whole was operating at net zero.

In a net zero world the only projects capable of generating genuine offsets would be 'negative emissions' projects that extract carbon dioxide from the atmosphere. A range of natural processes, such as reforestation and soil carbon projects, are capable of drawing-down carbon dioxide from the atmosphere and storing carbon in biomass and mineralised matter.

There also exist industrial draw-down processes, such as 'direct air capture' (DAC) technologies. DAC involves removing carbon dioxide from the air, typically using industrial fans to concentrate airflow and then using a solvent or other separation method. Once carbon dioxide has been captured, it can be notionally stored in geological formations deep underground. There are several types of geological formation amenable to storage, including: saline formations deep below freshwater aquifers; depleted oil and natural gas reservoirs; coal seams that are uneconomic to extract from; igneous basalt formations, with concentrations of magnesium and calcium' and organic-rich shales with similar properties to coal.

Storage is typically made permanent by either a 'cap rock' layer that covers the reservoir or saline formation to prevent leakage, or by relying on chemical reactions between the carbon dioxide and basalt, coal or shale, to mineralise or absorb the carbon and permanently lock it in the stratum.

While often proposed as an emissions reduction option, these draw-down technologies have also been identified as a key technology required beyond 2050 — to reduce excess stocks of greenhouse gases in the atmosphere and thereby reduce the likelihood of the worst effects of climate change (IEA 2020a; Johansson et al. 2020; van Vuuren et al. 2013). Using these technologies to achieve reductions in atmospheric concentrations of greenhouse gases will require that at least some portion of draw-down projects are not used as offsets. If used as offsets, the atmospheric carbon dioxide that was drawn down would simply be replaced by the emissions they were seeking to offset.

Prior to achieving net zero emissions, there will remain a role for a broader range of offsets, not just negative emissions offsets. The credibility of these offsets will depend on their measurability, permanence and additionality (discussed further below).

The credibility of such an approach to achieve our net zero target would depend on the credibility of offsets used towards the achievement of these goals, which would ultimately turn on the perceived additionality, measurability and permanence of those offsets, characteristics discussed in greater detail below.

Because many of these abatement opportunities will be best identified and pursued by households and businesses, those closest to their own consumption preferences and production processes, it will be important that Australian climate policy produces enduring abatement incentives across a wide range of sectors. The broader the range of sectors brought to the national abatement task, the greater the number of lower cost abatement options, and the lower the abatement burden on individual sectors. Carbon pricing mechanisms that establish a consistent unit price for emissions are generally accepted to be the most efficient means of generating least-cost abatement across an economy.



Finding 6.2

An efficient abatement path prioritises lower cost abatement options before higher cost abatement options are pursued

Setting a long-run emissions target does not mean that all emissions sources need to be reduced at the same time. Pursuing low-cost abatement options before proceeding to higher cost options provides time for innovation to reduce the cost of those higher cost options before they need to be pursued. Broad-based emissions pricing schemes can be an efficient way of ordering abatement actions in this way.

4.1 The implications of Australia's recent approach to emissions abatement policy

Australia's political experience with explicit carbon pricing has encouraged Commonwealth, State, and Territory governments to implement and maintain a suite of alternative sectoral abatement policies — renewable energy targets, feed-in tariffs, energy efficiency trading schemes, public funding of sectoral abatement projects, tax concessions for domestic biofuel production, and more recently, tax concessions for electric vehicles, to name a few. While these measures do not place an explicit price on carbon, they all impose indirect, implicit or 'shadow' carbon prices on the Australian economy, many higher than would be expected to be delivered via an emissions trading scheme (box 4.2). In this way, Australia's current approach to achieving our emissions reduction targets is coming at a higher overall cost than is necessary.

Some of these higher costs can result from a 'charismatic abatement' problem where more government support is provided to more 'visible', but higher cost, abatement technologies than the less visible, but more cost-effective, options that would be elicited by an emissions trading scheme (box 4.3). This charismatic abatement problem might help explain the high levels of government support provided to home solar panel installation during the late 2000s, and the high levels of government support being provided to electric vehicles today, despite these being some of the highest cost abatement options available (box 4.2, 4.4).

Box 4.2 – Indirect carbon prices in Australia, selected policies

Australia’s political experience with explicit carbon pricing has encouraged Commonwealth, State and Territory Governments to implement a range of alternative policies to address emissions. These alternative policies impose a wide range of indirect carbon prices on the Australian economy, some many times higher than what would be expected to emerge from economy-wide explicit carbon pricing that achieved the same amount of abatement.

Level of Government	Policy	\$ per tonne of CO ₂ -e ^{a,b}
Commonwealth	Exemption of EVs from fringe benefits tax	\$987 – 20 084 ^c (\$905 – 13 580)
	Renewable energy target — Small-scale technology certificates	\$57 – 209 ^d
	Renewable energy target — Large-scale generation certificates	\$60 – 220 ^d
	Emissions Reduction Fund (ACCUs)	
	— Average fixed-delivery price ^e	\$12 – 59 ^g
	— Spot price ^f	\$29 – 144 ^g
	Discounted excise for E10 ^h	\$128 – 274 ⁱ
Discounted excise for B20 ^h	\$135 – 152 ⁱ	
New South Wales	Energy savings certificates ^j	\$41 in range \$32 – 59
	\$3000 EV subsidy and stamp duty exemption	\$271 – 4914 ^c (\$222 – 3323)
Victoria	Victorian energy efficiency certificates ^k	\$69
	\$3000 EV subsidy and registration discount	\$287 – 4807 ^c (\$217 – 3250)
Queensland	\$3000 EV subsidy, stamp duty discount, registration discount	\$282 – 4933 ^c (\$222 – 3335)
Tasmania	EV stamp duty exemption	\$134 – 2137 ^c (\$96 – 1445)
South Australia	\$3000 EV subsidy and registration exemption for three years	\$209 – 3647 ^c (\$164 – 2466)

a. Estimates have been rounded to the nearest dollar. **b.** Bracketed prices reflect incorporation of 100% renewable energy assumption, provided for sensitivity analysis. Given the opportunity cost of using renewable energy for EV charging, the unbracketed prices are arguably more relevant. **c.** For simplicity, this estimate reflects fiscal costs per tonne of abatement, not the broader economic cost per tonne of abatement. The latter would also incorporate the impact of reduced taxation on the economy provided by tax concessions. Some of these differ from the preliminary estimates provided in the interim report, reflecting greater consideration of abatement generated by EVs once in the secondary market, and a slightly narrower range of additionality assumptions (75% to 5%). The high *level* of estimates for demand-side EV policies reflect their generosity relative to their abatement benefits, while the notable *range* in prices reflects a spectrum of additionality and bring-forward assumptions ahead of assumed mainstreaming of EVs in new car sales by 2035. See appendix A for further details on the estimation approach. **d.** The range presented reflects three different emissions intensity factors as

Box 4.2 – Indirect carbon prices in Australia, selected policies

well as additionality ranging from 50–100% (appendix A) **e.** The most relevant ACCU price for the Emissions Reduction Fund — the biggest buyer of ACCUs — is the average fixed delivery contract price, which is \$11.70. **f.** The spot ACCU price might be more relevant for offset sellers and private buyers and was equal to \$28.75 on 5 September 2022. **g.** The upper bound estimate accounts for additionality concerns relating to common emissions reduction methods. Macintosh, Butler and Evans (2022) suggest that up to 80% of credits issued under three of the ERF’s most popular methods (which account for about 75% of total credits issued) do not represent genuine emissions cuts that would not have happened otherwise. **h.** The discounted rate of excise only applies to domestically produced ethanol and biodiesel. **i.** Lower bound estimate considers only scope 1 greenhouse gas emissions. Upper bound estimate considers lifecycle emissions and is consistent with PC (2011). The excise rates used are those that were in place prior to the reduction that took place on 30 March 2022. **j.** The certificate price used is the penalty rate, which should represent an upper bound, though the spot price sometimes exceeds the penalty rate. A range is calculated using the emissions intensity of Australian coal generation as a lower bound, the average emissions intensity of electricity generation in New South Wales in 2019-20 as a central estimate and the emissions intensity of gas generation as an upper bound. **k.** The price listed is the spot price, which is likely higher than the price involved in long-term contracts.

Sources: Chalmers (2022); Demand Manager (2022) NSW Government (2022); DELWP (2021); Queensland Government (2022a, 2022b, 2022c); TCCO (2021); Department of Treasury and Finance (2022); Department for Energy and Mining (2022); Government of South Australia (2021); DWER (2021); Fisk (2021).

In addition, a less visible approach to climate policy risks exposing Australian industry to additional carbon pricing overseas. This possibility is apparent in the emerging design of the European Union’s (EU’s) Carbon Border Adjustment Mechanism (CBAM), which is planned to be progressively implemented between 2023 and 2026. The EU CBAM aims to impose carbon prices on imports of particular goods that are broadly comparable to those faced by EU producers. The stated intent of the policy is to level the playing field between domestic and foreign producers competing with one another in the EU market, taking into consideration carbon prices already paid by foreign producers in home countries.

However, it appears that the EU might only recognise direct carbon prices faced by foreign producers, not the range of indirect carbon prices currently imposed on the Australian economy. While the impact of the EU CBAM on Australia is likely to be limited, those impacts will grow if it applies to a wider range of imports over time, and if the EU example is followed by other major economies. In this way, Australia’s current approach to climate policy risks exposing our economy to a double cost — the first through a range of indirect carbon prices that may be higher than available alternatives, and the second through the subsequent imposition of direct carbon prices on our exports.¹

Consistent and enduring incentives to reduce emissions across the economy are needed

Australia’s current suite of domestic policies, along with the longer standing emissions abatement policies of the major economies, and the global technological developments they have supported, have started to shape Australia’s future decarbonisation path. The uptake of renewable energy is projected to rapidly decarbonise our electricity system over the next decade,² in turn supporting the decarbonisation of transport

¹ While the EU CBAM might recognise carbon prices imposed on facilities captured by the Safeguard Mechanism (discussed below), the fact that the Safeguard Mechanism only applies a carbon price to those facility emissions that are above that facilities baseline, and provides free emissions allowances for all emissions below the facility baseline, means that Australian exporters captured by the CBAM might only receive a partial discount on CBAM liabilities.

² AEMO’s 2022 Integrated System Plan (ISP) projects several scenarios for Australia’s electricity system between now and 2050. Under the scenario considered ‘most likely’ renewables and storage are projected to account for 86% of Australia’s energy in 2030-31, 95% in 2040-41 and 97% in 2050-51, with the remainder made up of peaking gas (AEMO 2022).

through electric vehicle uptake, and the production of 'green hydrogen.' In time, 'green hydrogen' might also support the decarbonisation of some parts of heavy industry and transport, though its most efficient applications are likely to be revealed in time. Remaining 'hard-to-abate' sectors such as livestock might be offset through the uptake of negative emissions technologies, though ongoing technological development and shifting consumer preferences might ultimately reduce the need.

While most of these technological developments are being driven by international policy settings, which will naturally accrue to net technology importers like Australia, a domestic policy architecture that creates enduring incentives to pursue emissions reductions across the economy will be important in driving their efficient domestic application. Moreover, creating enduring abatement incentives may become increasingly important as the global move away from fossil fuels leads to structural declines in the price of coal, oil and gas — a development that might otherwise encourage their increased use in Australia, at the potential expense of longer-run emissions reduction objectives.

Box 4.3 – Why economy-wide pricing mechanisms deliver least-cost abatement

All policy interventions aimed at generating emissions abatement impose carbon prices on the economy. However, in many instances, these prices are hidden (so-called 'shadow', 'implicit' or 'indirect' carbon prices) and apply only to a narrow set of actions. The narrow coverage of many interventions allows other emissions source to expand, reducing their overall effectiveness. Moreover, piecemeal interventions that target particular sources of emissions, or that promote the application of particular technologies lead to a greater range of abatement 'prices' across the economy, driving higher cost abatement than is necessary to achieve near-term emissions reduction goals. Piecemeal interventions can also overlap with other piecemeal measures, unnecessarily increasing the economy-wide cost of abatement in the process.

The application of a consistent carbon price across a broad range of sectors, whether implemented by carbon taxes or cap-and-trade schemes, reduces the economy-wide cost of abatement (or enables greater abatement for the same total cost) for several reasons. First, by allowing the concentration of abatement efforts in the most cost-effective options available and thereby transferring remaining emissions rights to those sectors that generate the greatest value-add from their use. Second, the application of a consistent price across a broad range of sectors reduces the scope for avoidance or 'leakage' into what would otherwise be uncovered sectors. More generally, an explicit price is also more observable and can be more readily factored into production and investment decisions.

Because businesses can be expected to pass on these increased costs to the consumers of their goods and services, emissions trading schemes provide a means of internalising the externalities associated with consumer choices. This move to more cost-reflective pricing will likely drive consumers towards less emissions-intensive goods and services, on price grounds alone, further reducing the emissions-intensity of economies with broad-coverage emissions trading schemes.

Linking a domestic emissions trading scheme with that of other countries, either by allowing for the transfer of emissions permits between the two countries or by allowing the importation of offsets from other countries, can establish the international price of permits as the upper bound for domestic permit prices. Doing so further lowers domestic abatement costs to the extent that the permits are credible, and that the international price is generally lower than the domestic permit price.

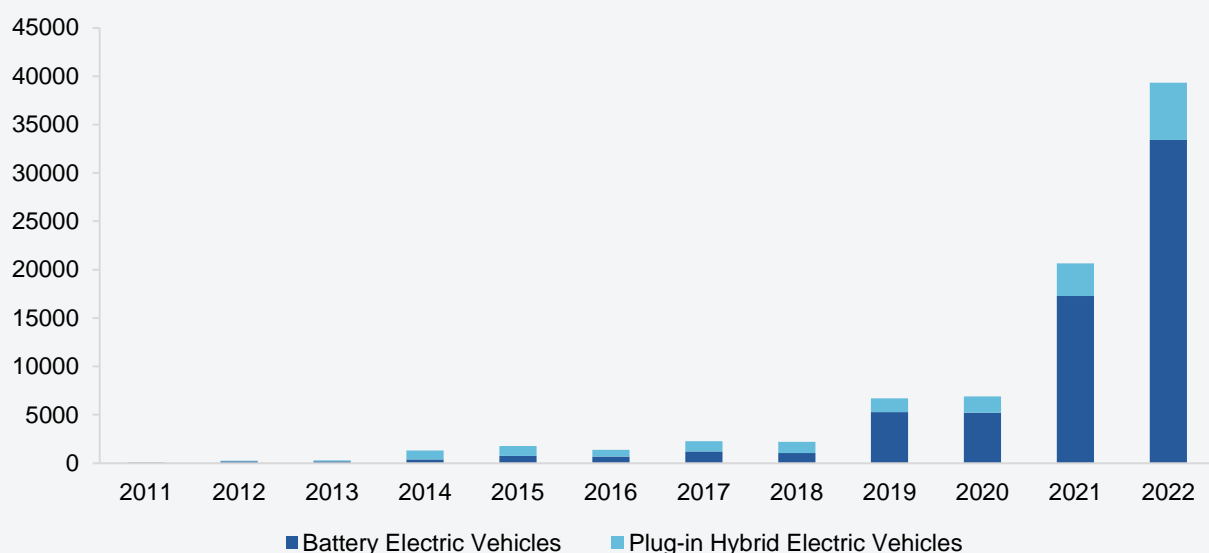
Box 4.4 – Case study: Why demand-side Electric Vehicle (EV) policies are an inefficient way to reduce emissions

In the absence of mechanisms that directly price emissions, governments have implemented various measures to encourage the uptake of low-emissions technologies such as EVs. While EVs stand to make an important contribution to Australia's decarbonisation, a key policy question is whether demand subsidies to expedite their uptake represent an efficient and effective means of achieving additional abatement, or whether alternative approaches might prove more desirable.

EVs will reduce emissions by leveraging the decarbonisation of our electricity system to reduce Australia's consumption of liquid fossil fuels. EV uptake might also reinforce the decarbonisation of the electricity grid by providing for a growing stock of second-hand EV batteries that could be reused to stabilise an increasingly renewable electricity grid. More generally, the transition to EVs stands to improve health outcomes associated with local air quality and improve energy security by reducing vulnerability to international oil supply disruptions.

The transition from internal combustion energy (ICE) powered cars to EVs is already underway in Australia, where the number of new car sales that are Battery Electric Vehicles (BEVs) or Plug-In Hybrid Electric Vehicles (PHEVs) has risen from less than 50 in 2011 to almost 40 000 in 2022 (figure below). While only 3.8% of total new car sales in Australia in 2022, the accelerating demand for EVs apparent since 2020 appears consistent with EVs reaching the second phase of the four-phase 'product lifecycle.' The four-phase product lifecycle comprises a preliminary 'market development' phase where a product is largely unproven and sales are low, a second 'market growth' phase where demand accelerates as the new product gains broad-based acceptance, a third 'market maturity' phase where demand largely grows in line with that of the overall market and a final 'market decline' stage where the product is superseded by a new technology.

New electric vehicle sales in Australia, by type and year



Sources: EV Council (2022); FCAI (2023).

Moving from the 'market growth' phase of the product lifecycle to the third 'market maturity' phase, might be particularly apparent from 2035 as many of the world's major car makers switch to majority share (or even 100%) EV production, driven by EV-only new car sale mandates in many of the world's major car markets — the European Union, Japan, California, and the 16 States that reference Californian vehicle standards

Box 4.4 – Case study: Why demand-side Electric Vehicle (EV) policies are an inefficient way to reduce emissions

(IEA 2022). As a net transport technology importer, it seems likely that any broad-based global transition towards EV production will naturally translate to broad-based Australian EV uptake along a similar timeline.

With EVs appearing to have reached the second phase of the product lifecycle, the principal constraints to their broader uptake before 2035 will be supply, not demand. Indeed, reports of extended waiting times for EVs are commonplace in Australia. With supply the principal constraint for EV uptake in Australia, policy efforts to increase the demand for EVs, such as tax concessions and rebates for EV purchases, run the risk of simply adding more people to the proverbial queue, subsidising people who are already in the queue, or in the case of tax concessions that are selectively available to some groups, simply pushing those selected groups to the front of the queue — all for no appreciable gain to the overall number of EVs on Australian roads, relative to what would have otherwise been the case.

This basic dynamic contributes to the high indirect carbon prices that are commonly estimated for demand-side EV policy measures. However, even if we assume that demand-side policies were capable of driving largely commensurate increases in EV purchases, brought forward from 2035 to today, they would still constitute a relatively expensive emissions abatement policy (box 4.2). Limited near-term emissions abatement available from switching from a petrol-powered vehicle to an emissions-intensive electricity grid powered EV plays a part. However, even if we were to assume that an EV was charged by emissions-free renewable energy that was incapable of being used for alternative purposes (and therefore constituted truly additional renewable energy capacity), the estimated indirect carbon price of these measures would only fall by between 8 and 33% (depending on the measure), remaining amongst the most expensive option for emissions abatement.

These findings are broadly consistent with a range of studies and publications that have noted the relatively high cost of demand-side EV measures, or have questioned the value of demand-side EV measures more generally.^a

The high cost of demand-side EV subsidies ultimately reflects the underlying generosity of the subsidies of such programs relative to each tonne of abatement potentially available from passenger vehicles. In Australia, this is particularly apparent in the case of the recently legislated exemption of some EVs from Fringe Benefits Tax (FBT), relative to the more modest, though still potentially high cost of abatement, state-level subsidies. Factoring in more conservative assumptions about the likely additionality and degree of bring-forward of those additional purchases, and the emissions intensity of the power source for EVs, simply increases the indirect carbon cost of these policies. While this analysis does not make assumptions about the likely bring-forward or additionality of EV purchases under these policies, it does make apparent the indirect carbon price implications of low additionality, and the degree of bring-forward of any additional EV purchases. The lower the assumed additionality, and the greater any bring-forward, the greater the cost per tonne of abatement (see appendix for further discussion of estimation approach).

Demand-side EV measures can also raise equity concerns when the chosen policy instrument is disproportionately relevant to higher income cohorts. This might be relevant to the FBT exemption for some EVs, to the extent that FBT is disproportionately relevant to higher income households. More generally, the purpose of the FBT system is to protect the integrity of the personal income tax system, dissuading higher income individuals from attempting to avoid personal income tax liabilities by taking a share of their income in the form of goods and services. Using the FBT system for alternative policy goals like attempting to drive EV uptake risks compromising the degree to which the FBT system protects the integrity of the personal income tax system, potentially reinforcing equity concerns in the process.

Box 4.4 – Case study: Why demand-side Electric Vehicle (EV) policies are an inefficient way to reduce emissions

Given that the principal constraint to the uptake of EVs in Australia is supply, due to both limited global production and the prioritisation of that limited supply to other car markets around the world, a more efficient approach to supporting EV uptake would be to take available steps to increase EV supply in Australia. This could include increasing fuel efficiency standards in Australia, which could potentially lead global EV producers to prioritise a greater share of global EV production to the Australian market (Martin, 2022). With appropriate protections, liberalising the importation of second-hand EVs into the Australian market would also open an alternative channel for EVs to enter the Australian market.

a. See for example Camara, Holtmark and Misch (2021), Fournel (2022), Nunes, Woodley and Rossetti (2022), and Freebairn (2022).

4.2 Foundational elements of Australia’s emissions abatement tool-kit

There are three components of Australia’s framework for emissions abatement that are well placed to be recalibrated to form an economy-wide abatement mechanism over time:

- **the Safeguard Mechanism** — the policy tool that requires Australia’s largest greenhouse gas emitters to keep their emissions below an emissions limit (a baseline)
- **Australian Carbon Credit Unit offsets (ACCUs)** — a tradeable financial product awarded to eligible projects that reduce greenhouse gas emissions
- **the Emissions Reduction Fund** — a Commonwealth government fund that purchases ACCUs, thereby indirectly funding emissions abatement activities that help to reduce Australia’s emissions.

Australia’s Emissions Reduction Fund (ERF) and Safeguard Mechanism (SM) began operation in 2016. The ERF was developed to contribute to the achievement of Australia’s emissions reduction goals by providing a mechanism by which the Australian government can purchase emissions abatement from eligible abatement projects. Projects that generate abatement in accordance with methodologies recognised by Australia’s Clean Energy Regulator (CER) can earn Australian Carbon Credit Units (ACCUs), which are eligible to be purchased by the ERF.

The biggest buyer of ACCUs is currently the Australian Government, through the ERF. However, a growing source of demand is from industrial facilities captured by the Safeguard Mechanism (SM). The SM was developed to protect against the possibility that the emissions abatement purchased by the ERF was not simply counteracted by an increase in emissions from industrial facilities. It attempts to do so by giving ‘baselines’ — effectively emissions budgets — to greenhouse gas producing facilities captured by the SM. These emissions budgets can be met either by pursuing internal emissions reductions at the facility, or by purchasing enough ACCUs to bring net emissions into line with facility baselines.

The SM does not have pre-defined sectoral coverage per se: it applies to all facilities that produce 100 000 tonnes of CO₂-e per annum, spanning a number of sectors. Facilities covered by the SM operate in mining, oil and gas, manufacturing, construction, waste and some transport sub-sectors (large rail companies and domestic airlines). The electricity sector is notionally included in the SM but is treated differently than other sectors (see detail below). The baselines that apply to these facilities have been set in several ways over the life of the SM, but are currently set in emissions intensity (that is emissions per unit of output) terms, not

absolute emissions terms. Most of these baselines are non-binding as they are above current facility emissions. The most notable example is the electricity sector, which has a baseline above the sector's aggregate emissions. Given the rapid decarbonisation of the electricity grid currently underway, it is likely that the current sectoral baseline will never become binding on the electricity sector.

A number of arrangements exist that have limited the degree to which the baselines are binding in any given year, including: allowing facilities to average out their emissions over several years; allowing for exemption from baselines in the case of 'exceptional circumstances'; and, in some cases, allowing facilities to apply for new baselines if their existing baselines are exceeded. In addition, the SM does not prevent new facilities from being built in these sectors. These arrangements mean that overall emissions can increase in sectors covered by the SM. Indeed, since the beginning of the SM, emissions from covered sectors have grown by 7% from 2005 levels, and have been projected to be 17% higher than 2005 levels by 2030 if the current scheme design is maintained (Reputex 2021). As the central policy tool for emissions abatement policy, ensuring that the SM's emissions baselines remain consistent with Australia's abatement goals will require ongoing adjustments to SM baselines over time.

4.3 Reforming Australia's Safeguard Mechanism

Recognition of these features, combined with an increase in Australia's 2030 emissions reduction target, has led the Australian Government to consider reforms to the SM that might better position it to contribute to the achievement of Australia's emissions reduction goals. While Government has announced its intention to retain many of the basic features of the existing SM, such as maintaining the schemes existing sectoral coverage, facility thresholds and emissions intensity baselines, the Review's discussion of the SM and its subsequent recommendations are offered in the possibility that the scheme will continue to evolve over time, perhaps following the next scheduled review of SM policy settings in 2026-27 (DCCEEW 2023).

Reforms to the SM could help move Australia towards a lower-cost approach to achieving its 2030 and 2050 emissions abatement goals, helping to safeguard productivity growth in the process. Implemented together, the broadening of the SM to include a greater range of facilities (by sector and facility-size), moving from emissions intensity ('production-adjusted') baselines to absolute emissions ('fixed') baselines, allowing for the generation of sub-baseline credits (credits granted to SM facilities that achieve emissions abatement below their baselines) and not providing additional assistance through the SM to emissions intensive trade-exposed entities (EITEIs), would increase the efficiency and equity of the scheme, reduce its complexity and better position the SM to contribute to Australia's economy-wide abatement task. The degree to which the SM credibly and efficiently contributes to the achievement of Australia's emissions abatement goals will also depend on the integrity of the Australian Carbon Credit Unit (ACCU) offsets recognised by the scheme (more below).

Moving from emissions intensity baselines to absolute emissions baselines

The Safeguard Mechanism effectively imposes emissions budgets on the facilities that it applies to. These budgets are expressed as 'baselines' and are defined in emissions intensity terms, not absolute emissions terms. Emissions intensity refers to emissions per unit of output while absolute emissions are total emissions from the facility. While they often tend to move together, they can diverge depending on what happens to output levels. For example, lower emissions intensity need not translate to lower aggregate emissions when output rises.

The SM's current use of emissions intensity baselines ('production-adjusted' baselines in the language of the SM) has been argued to have a lower economic impact on individual facilities than absolute emissions

baselines ('fixed' baselines in the language of the SM) in so far as it allows captured facilities to increase production without exceeding their baselines, and precludes facilities from using production cuts to stay below their baselines. By doing so, the argument goes, an emissions intensity baseline minimises the overall impacts of the policy on production levels, thereby reducing the economic impacts of emissions constraints.

However, the strength of this argument diminishes once a country decides to pursue an absolute emissions reduction goal. Given that Australia has a nationwide emissions reduction target, the ability for SM-covered sectors to increase their overall emissions either imposes greater absolute abatement burdens on sectors not covered by the mechanism, or undermines achievement of the overall emissions target. Emissions intensity baselines may also raise overall abatement costs by not creating an incentive for businesses with multiple facilities to reduce output in their more emissions intensive facilities, and increasing their output in their less emissions intensive facilities. More fundamentally, it is incorrect to suggest that absolute emissions baselines prevent individual businesses and sectors from expanding output. Doing so would simply require facilities wishing to compete with other emissions generating facilities for the right to do so, contributing to the efficient allocation of increasingly scarce emissions rights in the process.

In addition, using emissions intensity baselines to target an aggregate emissions reduction target could complicate medium-to-long term investment planning. While an individual facility may know that Australia has a 2030 and a 2050 emissions reduction target, it may be less clear what that means for the facility's emissions intensity baseline over coming decades. Facility owners would not only need to form a view on what those aggregate emissions reduction pathways would mean for facility level baselines but would have to make long-run output estimates to assess what abatement options they would need to pursue in order to meet those future baselines. They would have to do this over a period in which consumption and production patterns will likely be changing as Australia enters a more carbon constrained world.

The shortcomings of emissions intensity baselines have been recognised for some time now. The 2008 Garnaut Review noted that a system with emissions intensity baselines 'introduced a high and unavoidable degree of arbitrariness' into the design of emissions reduction policy and would 'raise transaction costs and encourage rent-seeking behaviour' (Garnaut 2008).

Transitioning the SM to operate on the basis of absolute emissions baselines would avoid these issues. It would increase the transparency and predictability of periodic adjustments to SM baselines, providing a somewhat clearer road ahead for SM facilities, abatement technology providers, offset producers in uncovered sectors, and investors more generally. The move to absolute emissions baselines would also reduce the administrative burden of the system by avoiding the need to report production levels alongside emissions levels and removing the need for facilities to provide third party audited production projections for new and significantly expanded facilities. Increased transparency around any periodic resetting of facility baselines would also promote integrity and public confidence in the process.

Should crediting of sub-baseline abatement be allowed (more below), an absolute emissions baseline could also act as a transitional assistance mechanism for covered facilities. This is because an absolute emissions baseline would allow facilities to achieve sub-baseline emissions by reducing output, regardless of the reason for that reduction of output. If a facility was closed down, and the associated sub-baseline abatement was eligible to generate credits, the sale of those credits would provide a form of exit payment for the owners of the closed facility. This would not be possible under a system of emissions intensity baselines.

Sub-baseline-abatement should be creditable

Under the current design of the SM, captured facilities need only prevent their emissions from rising beyond their baseline, either by pursuing internal abatement options, or by purchasing a sufficient number of Australian Carbon Credit Unit (ACCU) offsets. This presents something of an asymmetry for facilities, in that

facilities are required to purchase ACCUs for any emissions that exceed their baseline, but cannot earn credits for any emissions abatement below their baseline. Providing symmetry in the SM would increase the efficiency of abatement by increasing the pool of commercially viable abatement opportunities and allowing the transfer of economy-wide abatement burdens to the least-cost abatement options within the SM, likely reducing economy-wide abatement costs, and safeguarding productivity growth in the process.

Sub-baseline crediting would sit most comfortably within a system of absolute emissions baselines. A SM that imposed emissions intensity baselines, while allowing those facilities to generate sub-baseline credits denominated in absolute emissions terms, would risk allowing SM facilities to generate sub-baseline credits while increasing their overall emissions. This could occur when a SM facility increased output in such a way as to fall below their emissions baseline while still increasing overall facility emissions. This might occur if output was increased in a less emissions-intensive way than average production. If this was undertaken by enough facilities it would be possible for total SM facility emissions to fall short of the absolute emissions reduction task asked of it, in turn imposing greater abatement burdens on non-SM emissions sources, or requiring a future 'catch-up' recalibration of SM facility baselines, presenting a source of uncertainty for all emissions generating entities in the process. Policy back-stops to limit this possibility, such as building an emissions buffer or reserve into the SM, would likely add to the overall abatement costs of the mechanism.

As set out above, if sub-baseline crediting were coupled with absolute emissions baselines it would also provide some degree of automatic transitional assistance for facilities that choose to markedly reduce their production in the presence of carbon constraints. The resulting reduction in emissions would generate credits that could be sold to facilities operating beyond their emissions baseline. This feature would not be present in the case of an emissions intensity baseline, given that output reductions cannot impact the emissions intensity of a facilities output. Neither would it be present in the case of an absolute emissions baseline that did not allow sub-baseline crediting.

These observations should not be taken as presenting a public policy case for industry assistance to SM facilities, but a simple drawing out of foreseeable interactions between possible SM design features. Future carbon constraints have been part of Australian policy discourse for several decades, and emissions abatement policy has been in place for much of this time. The case for transitional assistance is strongest when industries are acutely impacted by unforeseen developments, and where those impacts risk producing broader costs for society. Entry into long anticipated, and progressively implemented, carbon constraints does not appear to have these features. Nevertheless, were governments pre-disposed to providing transitional assistance to industry, the combination of sub-baseline crediting and absolute emissions baselines may be judged sufficient to do so, reducing further calls on limited fiscal capacity.

Expanding sector coverage

The sectoral coverage of the Safeguard Mechanism is currently limited. This is particularly apparent in its treatment of the electricity sector and its omission of much of the transport sector. Broadening the coverage of the SM would move Australia towards a lower cost approach to emissions reductions.

Electricity sector

As noted above, the electricity sector is notionally included in the SM. However, it is treated differently than other sectors. While facilities in other sectors are captured by the SM once they emit 100 000 tonnes or more of CO₂-e per annum, in the electricity sector the SM baseline only applies to the sector as a whole, and is currently set at 198 million tonnes of CO₂-e per annum. That is, the individual electricity generators that comprise the sector do not currently face facility level baselines. Under its current design, it is only once the sector wide baseline is breached that the SM will impose facility level baselines on individual power stations.

However, the steady decarbonisation of the electricity sector underway will likely preclude the sector wide baseline from being breached.

The current treatment of the electricity sector has been justified on the basis that ‘the electricity sector behaves more like a single entity, where the output produced is centrally coordinated to meet demand in real time’ (CER 2022). However, this characterisation overlooks the notable difference in emissions intensities of the electricity generators that compete with one another in Australia’s electricity markets. Failing to account for these emissions differentials within the SM reduces the extent to which low emissions electricity sources can compete with high emissions electricity sources, relative to what would otherwise be the case.

Facility level coverage of individual electricity generators would move Australia towards a lower cost abatement path. It would do so by bringing a greater pool of potential abatement options to the SM’s overall abatement task. These benefits would be compounded by allowing for sub-baseline crediting, which would enable the transfer of scarce emissions rights from those facilities that are readily able to reduce emissions, to those that are less able to do so. The incorporation of the electricity sector into the SM would also reduce the policy case for additional sectoral interventions that can add to the cost of Australian emissions reductions (discussed further below). Finally, facility level coverage of electricity generators would promote enduring abatement incentives for the sector, which could prove important in constraining any future rebound in electricity sector emissions were coal and natural gas prices to undergo structural declines as the world progressively decarbonises. Failing a move to facility level coverage, a reduction in the sectoral baseline would remove existing headroom above current sectoral emissions, thereby helping to limit any future rebound in electricity sector emissions. However, this would not be as efficient as facility level coverage because it would not allow for the transfer of emissions rights between sectors and would not efficiently price emissions differentials between competing generation technologies.

The inclusion of a rapidly decarbonising electricity sector in the SM might prompt concerns about markedly reducing abatement burdens on existing SM facilities. However, given that the SM imposes baselines on all captured facilities, and that these baselines are proposed to be collectively calibrated to Australia’s overall national emissions reduction goals, there is little reason to expect this to occur. That is, industrial facilities would continue to face their own individual baselines if electricity generators are included or excluded from the SM. Moreover, given that Australia has set itself the goal of achieving net zero emissions by 2050, within one lifecycle of a 30-year industrial facility, the abatement incentives facing industrial facilities would ultimately be determined by the credibility of Australia’s 2050 net zero emissions target.

Transport sector

Given its focus on emissions directly produced by facilities (‘Scope 1 emissions’) that produce more than 100 000 tonnes of CO₂-e per annum, the SM currently applies to only some elements of the transport sector, such as large rail companies and domestic airlines. But as it is individual cars, buses and trucks that produce Scope 1 emissions in the ground transport sector, all of which individually fall below the 100 000 tonne threshold, the ground transport sector is effectively uncovered by the SM.

Yet transport emissions are a substantial, and growing, source of Australian emissions, increasing from less than 10% of Australian emissions in 1990 to 18.6% in 2021. All else equal, expanding the Safeguard Mechanism to include the transport sector, by imputing all downstream Scope 1 emissions from vehicles to upstream fuel wholesalers, would reduce the economy-wide cost of emissions abatement.

Were electricity generators included at facility level in the SM, inclusion of fuel wholesalers would also restore the transport technology neutrality of the SM — being imposed on the electricity used to power electric vehicles, and the liquid fuels used to power conventional internal combustion engine vehicles. In

addition, the extension of the SM to fuel wholesalers would further reduce the already limited policy case for the high shadow carbon price policy measures aimed at promoting electric vehicle uptake (box 4.3).

Lowering facility thresholds

The Safeguard Mechanism currently applies to facilities that produce greenhouse gases equal to or above a threshold of 100 000 tonnes of CO₂-e per annum. Reducing this facility threshold to 25 000 tonnes of CO₂-e would capture a greater number of facilities and increase the proportion of emissions covered by the scheme. Under the 100 000 tonne facility thresholds, the SM covered 212 individual facilities that collectively accounted for about 27% of Australia's annual greenhouse gas emissions in 2020-21. Including the grid-connected electricity sector, covered by the SM at a sectoral level, increases this proportion to about 57% of national emissions.

Reducing the facility threshold from 100 000 to 25 000 tonnes of CO₂-e would increase the proportion of national emissions covered by the SM to about 60%. Arguments against the reduction of thresholds might note the diminishing returns to increased coverage as moving to a 25 000 tonne facility threshold while adding more than 300 additional facilities to the SM would only increase emissions coverage by about 3 percentage points. However, the optimal number of covered facilities is not determined by the ratio of emissions coverage to facility coverage, but by comparing the marginal social benefit of including more facilities to the marginal social cost of covering those additional facilities.

Lowering facility thresholds would share Australia's overall abatement task between a greater number of facilities. It would also place a wider range of facilities on a more level playing field, thereby limiting any future migration of domestic production towards smaller, less efficient facilities, as carbon constraints become increasingly binding. It would also reduce the extent to which decarbonising facilities 'drop out' of Safeguard Mechanism emissions controls once their emissions fall below 100 000 tonnes of CO₂-e. The additional compliance burden of moving to a 25 000 tonne facility threshold would be limited, given that these facilities are already required to report their emissions through the National Greenhouse and Energy Reporting Scheme (NGERS).

Carbon leakage and emissions-intensive trade-exposed industries

Concerns about 'carbon leakage' are commonly raised in response to domestic climate policy proposals. The threat of carbon leakage is said to emerge when domestic climate policy places domestic producers at a competitive disadvantage to foreign producers that do not face comparable carbon constraints in their home countries. In this situation, the imposition of domestic carbon constraints could lead to domestic producers losing market share to foreign producers that do not face carbon constraints, with associated emissions simply being transferred to (or 'leaking' into) those countries — all to no benefit to global emissions. Carbon leakage concerns are most pronounced for emissions intensive businesses that face international competition, so called Emissions-Intensive Trade-Exposed Industries (EITEIs).

Common responses to carbon leakage concerns have been to make EITEIs at least partly exempt from domestic climate policy. In countries with emissions trading schemes, this commonly takes the form of providing a percentage of emissions permits required by EITEIs for free. Carbon Border Tariffs (CBTs) are an alternative approach to addressing carbon leakage concerns, not by protecting domestic producers from domestic climate policy, but by making foreign producers also subject to domestic climate policy, through the levying of import tariffs that are broadly equivalent to the carbon costs faced by domestic producers. While a range of countries have expressed some degree of openness to the CBTs, the most advanced proposal is the European Union's Carbon Border Adjustment Mechanism (CBAM), which is planned to be progressively implemented between 2023 and 2026.

However, there are questions about the extent to which carbon leakage will occur in response to domestic climate policy, given that production location decisions are based on a range of factors, and that many countries have adopted carbon constraints. Moreover, as the world's major economies pursue emissions reduction goals it is plausible that products produced under carbon constraints will come to enjoy a competitive advantage over those that are not. In addition, if major economies are to meet their net zero emissions targets, EITEIs will need to collectively contribute to emissions abatement. Failing to impose carbon constraints on EITEIs will simply transfer the cost of emissions abatement to other sections of the economy, or to taxpayers if government is left to purchase a greater number of offsets to achieve national net zero targets. Any special treatment of EITEIs under the Safeguard Mechanism should weigh the risks of carbon leakage against the costs of transferring additional abatement burdens to non-EITEI producers.

Moreover, it should be noted that Australia's Safeguard Mechanism is effectively a 100% free emissions permit allocation system for sub-baseline emissions. The Safeguard Mechanism caps facility emissions and requires those facilities to either pursue internal abatement options or purchase ACCU offsets to bring emissions down to their relevant baseline. Facilities do not need to pay for any emissions below this baseline. In this way, the Safeguard Mechanism is effectively a 100% free permit system for all sub-baseline emissions. This treatment is provided to all captured facilities regardless of whether they are considered EITEIs or not.

Over time, Australian EITEIs will need to pay for a growing proportion of their carbon emissions as baselines are progressively reduced in line with Australia's nation-wide emissions reduction goals. However, this is broadly the same treatment as is commonly applied to EITEIs captured by emissions trading schemes, with the percentage of free permits allocated under emissions trading schemes progressively falling over time.

For example, under Australia's Carbon Pricing Mechanism (CPM), which operated between 1 July 2012 and 30 June 2014, EITEIs were divided into two categories, highly emissions intensive trade exposed ('high EITEIs') and moderately emissions intensive trade exposed ('moderate EITEIs'). When the CPM first began operation on 1 July 2012, high EITEIs received 94.5% of average sectoral emissions for free, and moderate EITEIs received 66% of average sectoral emissions for free. Both rates of free permit allocation were scheduled to fall by 1.3% per annum (Talberg and Swoboda 2013; Talberg, 2013). At that rate, high EITEIs would have received 81.5% of average emission for free by 2022-23, and moderate EITEIs would have received 53% of average sectoral emission for free in the same year.

Similarly, the EU emissions trading scheme (EU ETS) distinguishes between 'highly exposed' EITEIs and 'less exposed' EITEIs (European Commission nd). The former currently receive 100% of permits up to their relevant benchmark for free, and the latter receive 30% of permits up to their relevant benchmark for free. However, the 'relevant benchmark' under the EU ETS is the average emissions intensity of the sectors best performing 10% (least emissions intensive) facilities (IEA 2020b). Similar to the CPM, this approach helps ensure that those facilities that have previously invested in emissions abatement technologies and processes are not placed at a competitive disadvantage for having done so, while also ensuring that some abatement incentives are placed on the less efficient facilities in the sector. However, by choosing the average emissions of the best performing 10% of the sector, these effects were greater than that elicited by the CPM's average sectoral emissions intensity benchmark.

It follows that the SM's current system of providing 100% free emissions up to facility baselines is more generous than the EITEIs provisions of both the EU emissions trading scheme and Australia's former Carbon Pricing Mechanism, casting doubt on the need for further EITEIs assistance under the SM.

Finally, providing special treatment to EITEIs is unlikely to protect Australian EITEIs from carbon prices in markets that impose carbon border tariffs. For example, the EU's planned CBAM appears set to only recognise explicit carbon prices borne by foreign producers in their home market. To the extent that some of Australia's carbon-intensive exports to the EU are captured by the CBAM, the Australian Government should

consider measures that ensure this revenue is collected by the Australian government, not the EU. Provisions that further lower the effective carbon price imposed by the SM on Australian exporters to the EU, may be simply offset by higher border adjustments under the CBAM. If a carbon price will be imposed on Australian exports to the EU in any case, the welfare of the Australian community will be best served by the Australian Government being the one to collect the associated revenue.

Given these features, the policy case for additional EITEI protections under the Safeguard Mechanism is unclear. Notable levels of public investment in abatement technologies that may prove crucial for abatement by Australian EITEIs (section 4.7) further diminishes the case. To the extent that decisions are made to provide further support to EITEIs, providing this assistance outside of the SM through budget appropriations, rather than through less stringent SM baselines, would increase the public transparency of this support, while retaining the abatement incentives generated by the SM. It might also offer greater flexibility for policy makers, with budget appropriations being potentially less enduring than the longer lasting effects of less stringent SM baselines.

Similarly, calls for Australia to implement its own CBAM should be resisted, recognising that the SM's system of free sub-baseline emissions allocations already provides protection against carbon leakage for SM facilities. Given this context, an Australian CBAM would risk simply acting as a form of trade protectionism that would ultimately result in higher input prices for Australian businesses, and higher goods and services prices for Australian households.



Recommendation 6.5

Make the Safeguard Mechanism Australia's primary emissions abatement mechanism

To increase certainty, reduce investment risk, and promote least-cost abatement, the Australian Government should progressively make the Safeguard Mechanism (SM) Australia's primary economy-wide abatement mechanism. To this end, the Government should collectively implement the following changes to the SM over time:

- define SM baselines, the total amount of annual net emissions that captured facilities are allowed to produce, in absolute emissions terms, not emissions intensity terms
- expand SM coverage by reducing SM facility thresholds, the total amount of annual emissions that a facility can produce before becoming subject to the SM, from 100 000 to 25 000 tonnes of CO₂-e
- impose SM baselines on individual electricity generators, not at the sectoral level. Failing that, the sectoral baseline for the grid connected electricity sector should be reduced, removing the bulk of the headroom between current emissions and the sectoral baseline, though this would not have the same efficiency benefits as directly including individual electricity generators in the SM
- expand transport sector coverage: once electricity generators are covered at facility level, the SM should be extended to liquid fuel wholesalers, with downstream vehicle emissions imputed to them
- allow generation of sub-baseline abatement credits. If SM baselines are expressed in absolute emissions terms, SM facilities should be allowed to generate emissions credits for emissions abatement below their SM baseline
- no additional Emissions Intensive Trade Exposed Industries (EITEIs) protections should be provided through the SM. The SM already provides the majority of emissions rights for free, and will continue to do so for the foreseeable future.

4.4 Promoting the integrity of Australia's offsets arrangements

As noted above, projects that generate abatement in accordance with methodologies recognised by Australia's Clean Energy Regulator (CER) can earn Australian Carbon Credit Units (ACCUs).

While the biggest buyer of ACCUs is currently the Australian Government, through the ERF, a growing source of demand is from industrial facilities that are captured by the Safeguard Mechanism.

The Clean Energy Regulator currently allows 37 abatement activities to generate ACCUs. However, about 75% of ACCUs generated under the program have been generated through three methodologies — avoided deforestation, human-induced regeneration of native forests and landfill gas capture.

Given the ability of Safeguard Mechanism facilities to meet their baselines by using ACCUs, the degree to which the Safeguard Mechanism credibly contributes to Australia's emissions reduction goals will depend, at least partly, on the integrity of ACCUs. Generally speaking, the integrity of an offset project increases with the extent to which it satisfies three factors — additionality, measurability and permanence.

- *Additionality* — an offset project is not additional if the project would have gone ahead without the ACCU revenue, either because it was a commercially viable project in the absence of ACCU revenue, or because it was required by existing laws and regulations.
- *Measurability* — an offset project is measurable if its associated abatement can be reliably measured. If the offset project generates a wide range of potential abatement outcomes, then its value cannot be reliably measured, and the risk of over-crediting will emerge.
- *Permanence* — an offset project is permanent if its emissions abatement cannot be reversed at a future point in time. Permanence concerns are particularly relevant for carbon sequestration projects in forests, vegetation and soil. Carbon stored in forests, vegetation and soils can be released in the case of fire, disease and changes in rainfall patterns. If the carbon sequestered in trees, vegetation and soil are subsequently released at some point in the future then the project has not offset emissions, it has simply delayed the release of those emissions. Make-good provisions, requiring that any release of sequestered emissions is subsequently re-sequestered, help to reduce permanence concerns with such projects.

The degree to which ACCUs methodologies deliver actual emissions abatement has faced some scrutiny, with some observers detailing what they regard as systemic flaws in the ACCU generation process (Macintosh 2022; Macintosh et al. 2022b, 2022a; Macintosh, Butler and Ansell 2022), and concluding that much of the abatement claimed under the three most common ACCU methodologies does 'not represent real and additional abatement' (Fearon 2022).

The *Independent Review of Australian Carbon Credit Units* (The 'Chubb Review') released by Government in January 2023, made a series of recommendations aimed at improving the integrity of ACCUs, including the discontinuation of the current avoided deforestation method for generating ACCUs (recommendation 9), an opt-in approach to strengthening additionality baselines for ACCU generating landfill gas project methods (recommendation 10), considering the merits of implementing a scheme-wide ACCU buffer to reduce the chance of system wide over-crediting due to mismeasured or non-additional offset projects (recommendation 7), emphasising the need for human-induced regeneration ACCU projects to be administered in a way that provides for permanent storage of sequestered emissions (recommendation 8), greater project level data availability and transparency (recommendation 4) and reforms to the institutional arrangements governing the scheme (recommendations 1, 2, and 3) (Chubb et al. 2022). The Australian Government has declared in-principle support for all recommendations of the Chubb Review (Bowen 2023).

A number of measures stand to assist with the implementation of these reforms. The recommended opt-in to stronger additionality thresholds for ACCU-generating landfill gas capture projects could be assisted by State and Territory regulators stipulating the volume or proportion of biogas that needs to be captured by existing landfill gas capture facilities under existing regulations. Doing so would protect against the possibility that some landfill gas capture project operators will opt-in to the higher baselines while others will not, and thereby place project operators within the sector on a more level playing field.

Ensuring that sequestration-related ACCU projects operate in a way that is consistent with expectations that the project area will permanently store carbon would be assisted by the alignment of ACCU scheme 'permanence' provisions with the more enduring permanence provisions of the biodiversity market. Under the schemes current permanence provisions, sequestration-related project proponents can opt-in to either a 25-year or 100-year 'permanence period', with make-good requirements only placed on emissions reversals during the chosen permanence period. For example, if a project proponent opted-in to a 25-year permanence period, and bushfire or insufficient rainfall led to the release of emissions previously sequestered by the project in year 24 of the project, the project proponent would have to undertake measures to re-sequester those released emissions. If the emissions reversal occurred in year 26, they would not. Similarly, if the project proponent opted-in to the 100-year permanence period and an emissions reversal event occurred in any year within that 100-year period, they would have to re-sequester those released emissions. If the reversal occurred outside of the 100-year period, they would not.

Currently, 55% of vegetation-related ACCUs, and 98% of soil-carbon related ACCUs, have opted in to the 25-year permanence period. The remainder have opted in to the 100-year permanence period (DCCEE, pers. comm., 6 December 2022). Given that Australia has 27 years to achieve its 2050 net zero target, sequestration-related projects that have opted in to a 25-year permanence period present a potential contingent liability for the Australian government, were shifting rainfall patterns, rising temperatures and increased bushfire frequency to lead to emissions reversals from sequestration-related projects in the years between the end of the 25-year permanence period and 2050. Were emissions reversals to occur within this period, it would potentially fall to the Australian Government to make up for these emissions reversals through the purchase of a proportionate volume of ACCUs, thereby placing a contingent liability on the Commonwealth budget.

Aligning the permanence provisions of the ACCU market with the more enduring permanence requirements of the biodiversity market would help to increase community confidence in sequestration-related ACCU projects. They would also help to manage the extent to which they inadvertently place contingent liabilities on the Commonwealth budget. While permanence requirements can vary, it is relatively common for biodiversity projects to have perpetuity-based permanence requirements placed on them, often implemented through biodiversity covenants on the land hosting the biodiversity project (Hardy et al. 2017). Alternative principles include requiring the biodiversity offset project to last for at least as long as the biodiversity impact being offset. For example, if a proposed development imposed a biodiversity impact that was estimated to last for 75 years, the offset project should last for at least 75 years. If the biodiversity impact was estimated to last for 125 years, the offset project should operate for at least 125 years (OECD 2016).

Given that CO₂ emissions can last for between 300 and 100 years in the atmosphere (Buis 2019) the current 25- and 100-year permanence periods of sequestration-based ACCUs appear to arbitrarily fall short of reasonable permanence expectations, and of the standard asked of biodiversity offsets.

Finally, delivery on the Chubb Review's call for greater project-level transparency and data sharing could be given effect to by requiring the publication of project-level offset reports submitted to the Clean Energy Regulator for the purpose of claiming ACCUs, and periodic audits that ACCU projects are subject to.



Recommendation 6.6

Increase the integrity of carbon offsets recognised by the Safeguard Mechanism

To make emissions reductions credible, the Australian Government should discontinue the 25-year permanence period for sequestration-related ACCU projects, introduce an additional class of sequestration-based ACCUs that align with the more enduring permanence provisions of the biodiversity market, and publish offset reports and project audit reports required by the Clean Energy Regulator. State and Territory Governments should stipulate the proportion of biogas that needs to be captured by existing ACCU-generating landfill gas capture projects under existing regulations.

4.5 Distributional considerations

The absence of economy-wide abatement policies places pressure on policy makers to implement sectoral and sub-sectoral policies such as subsidies for home solar panel installation, subsidies for low emissions technology deployment by industry and tax concessions for electric vehicles. These measures are not only more costly than economy-wide alternatives, but they can also raise several distributional concerns. First by imposing higher overall abatement costs on Australia that fall disproportionately on different sections of the community; and second, by selectively benefiting some sections of the community more than others. For example, electric vehicle subsidies channelled through salary sacrifice and fringe benefits tax arrangements might be expected to principally benefit higher income individuals who tend to have the greatest interest in salary sacrifice and fringe benefits arrangements.

By contrast, distributional impacts of economy-wide carbon pricing measures will mainly reflect impacts on prices of goods and services. As lower income households spend a higher proportion of their incomes they may bear a disproportionate burden, but regressivity may be moderated by the higher emissions intensity of high income household consumption patterns and once impacts over the lifecycle are accounted for.³

Moreover, the fact that the Safeguard Mechanism does not price sub-baseline emissions allowances should help to mitigate such concerns. While falling baselines will progressively impose greater abatement goals on captured facilities, all sub-baseline emissions will continue to be unpriced. Moreover, the key household assistance measure implemented following the introduction of the Carbon Pricing Mechanism on 1 July 2012 — the tripling of the tax-free threshold from \$6000 to \$18 200 — remains in place today, despite the Carbon Pricing Mechanism ceasing operation on 1 July 2014.

4.6 The role of other measures

With a national emissions reduction target in place, and a broad-based emissions abatement mechanism implemented to achieve it, the public policy case for additional sectoral interventions would rely on those additional interventions being genuinely 'complementary measures': that is, measures that either efficiently address non-price barriers to abatement, or that deliver broader non-carbon abatement social benefits. For example, were the Safeguard Mechanism to be made more binding on the electricity generators, the ongoing

³ Given that incomes tend to rise and fall over the course of an individual's life, assessing the regressivity of a particular policy change at a given point in time can generate a higher regressivity estimate than when total lifetime income and total lifetime income are taken into consideration.

need for additional policy support for renewable energy would be brought into question, unless it could be shown that it efficiently remedied non-price barriers to renewable energy uptake or drove non-carbon social benefits.

Similarly, were an amended Safeguard Mechanism to be extended to the transport sector, or covered by a broadly comparable mechanism, the policy case for Commonwealth tax concessions for electric vehicles (which, given their high cost per tonne of abatement, is weak even without a broad-based abatement mechanism) would be further diminished.

This would also be true for the range of state and territory measures that are currently in place, including jurisdictional emissions targets. Once a national emissions abatement target is established, and an economy-wide abatement policy is implemented to achieve it, these measures would impose a range of costs on the Australian economy, for little or no benefit to the national emissions abatement task. While such state measures may be publicly justified on the grounds that they would allow states to capture a desired share of the new industries and the 'green jobs' associated with them, such motivations are likely to render such measures a form of industry assistance that would likely add to Australian abatement costs for little actual gain to nationwide emissions reduction efforts (box 4.5).

Given the potential for such policy interactions, it will be important that Australian governments (Commonwealth, State, and local) take a coordinated and disciplined approach to policy development. Sound policy development would include demonstrating how new and existing policies complement the SM central mechanism or target additional emissions abatement measures in sectors not covered by the Safeguard Mechanism. Policies that are found not to be complementary to the SM should be phased out, and all remaining policies should have their expected implicit carbon price independently estimated and independent and made public.

Box 4.5 – 'Green jobs' and industry policy under an emissions cap

Once national emissions reduction targets are in place, economy-wide policy settings to achieve those goals are implemented, and the credibility of any associated offset regime is ensured, the value of additional state-based measures will depend on the extent to which they are complementary measures — either efficiently addressing non-price barriers to abatement or delivering non-carbon abatement benefits.

States and territories pursuing individual abatement policies that do not satisfy these conditions would not make additional contributions to national decarbonisation but would simply alter the distribution of that national abatement between the states and territories — driving increased abatement in their own states while simultaneously freeing up emissions space for other states and territories to use — likely at greater overall cost. Doing so would constitute a form of state-based industry policy, directing resources to abatement industries in that state or territory, for no benefit to the overall emissions abatement task.

Such industry policy might be communicated as supporting 'green jobs' or 'clean energy jobs' in that state or territory but the value of doing so would be of questionable value for several reasons. First, pursuing sectoral jobs targets typically does not lead to additional overall employment, it simply reallocates workers from one industry to another, likely at the expense of the comparative advantage of those workers, weighing on productivity in the process. This reallocation effect is starker in a near full employment economy.

More generally, once an economy is pursuing a national emissions reduction target the notion of 'green jobs' begins to lose meaning. First, because lower emissions intensity jobs in one jurisdiction simply

Box 4.5 – ‘Green jobs’ and industry policy under an emissions cap

allow others to engage in higher emissions intensive activity, and second because some emissions intensive activities will be required to pursue longer-run emissions reductions e.g. coking coal, iron ore, bauxite and rare earths extraction and processing are all currently required for the deployment of renewable energy and battery technology.

Whether a country should be regarded as a ‘green’ economy or a ‘clean energy’ economy is more meaningfully judged by the overall emissions intensity of the economy, not the emissions intensity of the individual jobs and industries that comprise it.

**Recommendation 6.7****Phase out policy measures not complementary to the Safeguard Mechanism**

Policy measures that are not complementary to the Safeguard Mechanism (SM) should be phased out to lower the overall cost of abatement. A review of existing measures should be undertaken to assess their complementarity to a reformed SM and recommend a timetable for the removal of non-complementary measures identified by the review. A ‘complementary measure’ would be one that drives emissions abatement from emissions sources not covered by the SM, addresses market failures that constrain the pursuit of abatement from emissions sources covered by the SM, or that delivers broader non-carbon abatement related benefits. Remaining non-Safeguard Mechanism policies should (1) stipulate how they are complementary to the SM, and (2) have their estimated abatement costs independently estimated and made public.

Least-cost electricity grid stability

Growing renewable energy uptake has raised questions about the future reliability of the electricity grid, given the intermittence features of individual wind and solar panel installations. This has led some to emphasise the importance of introducing stabilising technologies to the electricity grid as it becomes increasingly renewable. To this end, on 8 December 2022, Commonwealth and State Governments announced their intention to introduce a Capacity Investment Scheme (CIS), by the second half of 2023. The final design of the CIS is yet to be made public, but the plan appears to be to pay suppliers of dispatchable renewable electricity (renewable electricity that can be made available at short notice), to pre-commit to making that electricity available as needed. It appears that non-renewable sources of electricity, like coal and gas fired power stations, will be excluded from the scheme.

Capacity mechanisms generally make capacity payments in advance of that capacity being required. In this way it can be considered a kind of retainer system, paying dispatchable electricity providers to commit to provide capacity during periods in which the demand for electricity exceeds supply. By contrast, statements to date suggest that the CIS will principally operate through a revenue underwriting mechanism, the value of which will be determined through periodic auctions, and which will be subject to both a price floor and ceiling. A mechanism might be designed to pass on the cost of these capacity/underwriting payments to network providers or retailers, and ultimately to household and business end users. Equally, these costs may simply be funded through taxation revenue.

It is not yet clear whether the announced CIS will be open to distributed household and business battery installations, aggregated and coordinated through ‘virtual power plant’ (VPP) platforms. Nor is it clear

whether demand side participation, either by large electricity users, or by large numbers of small users aggregated through VPP platforms, will be allowed. Demand side participation could stabilise the electricity grid not by bringing supply into greater alignment with demand at each point in time, but by bringing demand into greater alignment with supply. For example, a VPP operator could fund the installation of technology required to simultaneously reduce non-essential sources of electricity demand throughout hundreds of homes and businesses and provide readily reducible demand, the demand side equivalent of dispatchable electricity supply, during periods of grid instability. Maximising the number of technologies and approaches that are allowed to bid into the mechanism would be consistent with a least-cost approach to managing intermittence challenges in the electricity sector.

The CIS would mark a move away from Australia's current system of principally relying on variable wholesale prices to balance supply and demand in Australia's electricity markets. While wholesale electricity prices are capped in the National Electricity Market (NEM), that cap is relatively high by international standards (ESB 2022, p. 11). The higher that prices are allowed to rise in the wholesale market, the greater the commercial feasibility of dispatchable electricity suppliers being purpose built to only generate electricity during unusually high price periods, either due to unusually high levels of electricity demand, or due to unexpected disruptions to electricity supply. Similarly, the higher that prices are allowed to rise, the greater the likelihood that energy users would make the investments required to notably reduce electricity demand during high price periods.

One of the advantages of relying on price signals to coordinate the matching of electricity supply and demand is that higher prices only need to be paid during those times when demand is greater than supply (see box 4.6 for discussion of the value of variable prices). By contrast, capacity payments to dispatchable electricity providers are to retain that potential capacity 24 hours a day, 7 days a week, and 365 days a year.

Box 4.6 – The benefits of price variability for grid stability, and broader policy goals

Prices act as a coordinating mechanism, helping to align the supply of a good or service in an economy with the demand for that good or service. An increase in prices for a particular good or service signals that demand is greater than supply, encouraging additional supply from producers, and reducing demand from users that no longer value the good or service at the higher price. Similarly, price falls signal that supply is greater than demand, encouraging increased demand from users looking to take advantage of lower prices, and reduced supply from producers that require higher prices to remain viable. These demand and supply side responses combine to align supply and demand over time.

The coordination benefits of variable prices are just as applicable to the electricity sector, which can be broadly broken down into three separate markets — the market for generation fuels, the wholesale market for electricity and the retail market for electricity. However, a range of price caps currently operate in all three markets in Australia, which run the risk of detracting from system reliability in some circumstances. These risks should be weighed against the perceived benefits of price caps when deciding whether to maintain existing price caps or proceed with the application of new price caps.

Generation fuel market — Price variability in the generation fuel market, largely coal and gas in Australia, allows the market share of competing generation types to vary so as to minimise the average cost of electricity produced by the wholesale market. For example, all else equal, as the price of coal and gas increases, the proportion of electricity supply delivered by coal and gas fired generators can be expected to fall, and the proportion delivered by renewable energy to rise. Similarly, as the price of coal

Box 4.6 – The benefits of price variability for grid stability, and broader policy goals

and gas falls, the share of electricity produced by coal and gas fired generators can be expected to rise, and that from renewables to fall.

Restrictions on this mechanism, like the December 2022 imposition of price caps on coal and gas sold to coal and gas fired generators, risks impeding this mechanism. While designed to be only a short-term measure to deal with energy market disruptions, interventions designed as short-term measures frequently become long-run policy settings. All else equal, depending on supply responses as discussed below, the longer that such price caps remain in place the greater the likelihood that they will artificially constrain the ability of renewable electricity producers to compete with subsidised coal and gas fired generators, potentially constraining the uptake of renewable energy to some degree.

The amount of coal and gas supplied to electricity generators at the capped price could also decline were supply diverted to export markets where higher, uncapped, prices are on offer. While some coal mines are not in a position to do so, if those coal mines that are positioned to divert supply to the uncapped export market were to do so, it may cause output disruptions for generators that are unable to secure the fuels that they require. Were that to occur, price caps aimed at placing downward pressure on wholesale electricity prices could have the unintended consequence of reducing grid reliability, thereby placing upward pressure on wholesale electricity prices.

Wholesale electricity market — The value of variable prices for grid reliability is also apparent in the wholesale market, by helping to bring supply and demand into alignment over the course of the day. In the extreme, the ability and probability of wholesale prices rising to very high levels might be sufficient to justify investment in dispatchable capacity just for periods of elevated market stress, even if only occurring several times per year. While wholesale prices are capped in the National Electricity Market, they are relatively high by international standards (ESB 2022).

The Capacity Investment Scheme announced by Commonwealth and Energy Ministers in December 2022 appears set to operate alongside existing wholesale price caps. If the scheme operates as intended, the range of prices experienced in the wholesale market should moderate, albeit with much of the associated decrease in average prices offset by capacity payments. It follows that were the scheme to be phased out at a future date, perhaps once the generation fleet had completed the transition from coal fired power stations to renewables and storage technology, the range of prices observed in the wholesale market would widen, all else equal, taking on much of the coordination required for grid stabilisation previously provided by the scheme.

Retail electricity market — Price variability in the wholesale market can create challenges for electricity retailers when they interact with harder price caps in the retail markets, imposed through annual Default Market Offer (DMO) regulatory determination processes, which caps the price of electricity for households and businesses that opt-in to standard contracts. While only about 10% of households and about 18% of businesses were on standard contracts in 2022 (AER 2022), they can constrain prices for non-standard electricity contracts by acting as a point of reference, and by acting as a substitute product.

The combination of variable wholesale prices and constrained retail prices presents a financial risk that retailers generally use derivatives to hedge away, though this can prove challenging during extended periods of pronounced market stress. DMO-related constraints on retailer prices are designed to protect consumers from being overcharged by electricity retailers. However, they also constrain the degree of price variability that could encourage a greater proportion of households and businesses from contributing to grid

Box 4.6 – The benefits of price variability for grid stability, and broader policy goals

stability, by reducing electricity usage during those times in the night when prices are high, and increasing use while prices are low. Under standard contracts, price variability is limited to off-peak, shoulder and peak pricing over the course of the day.

Constraints on retail price variability may become an increasingly important consideration as Australia's transport fleet progressively moves to electric vehicles (EVs), which could either contribute positively or negatively to grid stability. EVs could contribute to grid stability if they were charged at those times of the day when electricity demand is low and supply is high, and partly discharged during peak periods when demand on the electricity grid is high. If the reverse charging pattern emerges, charging EVs during peak periods, then the rise of EVs may compound pressures on the electricity grid. Price variability in the retail electricity market may prove the most effective means of encouraging EV charging patterns that contribute to grid stability. This may be sufficiently encouraged by peak, shoulder and off-peak price differentials over the course of the day but will warrant monitoring as the transport fleet electrifies.

A well-functioning CIS would reduce the range within which wholesale electricity prices would move, with CIS-underwritten capacity being called to market as wholesale prices start to rise, which could notionally leave average electricity prices unchanged relative to what would otherwise be the case. However, reliance on a high-profile CIS for electricity grid resilience may lead to 'over-insurance', supporting more investment in dispatchable capacity than is necessary to provide grid stability, and thereby delivering electricity system resilience at a higher average cost than might have been delivered by variable prices alone.

It is also unclear to what extent the CIS will be required to drive investment in storage capacity, given previous Commonwealth and State government commitments to invest in storage capacity, and the likely uptake of battery technology by households and businesses over coming years. For example, the NSW Government Renewable Energy Zones program includes support for large chemical battery storage facilities such as the 700 MW Waratah Super Battery, Victoria has committed \$119 million to the delivery of a 2.6 GW battery storage target by 2030 and 6.3 GW by 2035, and the Australian Renewable Energy Agency (ARENA) has set aside \$176 million for its Large Scale Battery Storage investment stream, through which it has either provided or pledged financial support for the installation of a fleet of large scale batteries throughout Australia. In addition, according to the Australian Energy Market Operator (AEMO) Integrated System Plan, more than two thirds of grid stabilising capacity required by 2050 could plausibly come from small scale distributed sources such as home battery installations, a rapidly growing fleet of electric vehicle batteries which could contribute to grid stability by recharging during the middle of the day when solar power output is relatively high and running a proportion of the battery down at night when electricity demand is relatively high, and smart-meter supported demand side responses by households and businesses, reducing the amount of power they use when electricity demand is high and relaxing these constraints as electricity supply increases. It remains to be seen how well these sources of grid stability will be directly accessed by the CIS, or how efficiently they will indirectly reduce stabilisation demand through the CIS.

Finally, when considering the grid stability challenge ahead, it is worth distinguishing between two distinct sources of potential grid instability. The first phase is transitional, relating to uncertainty around the sequence in which existing coal-fired power stations shut down and exit from the grid, potentially before an offsetting quantity of renewable generation capacity becomes operational. The second is more structural and relates more strictly to the intermittence features of individual photovoltaic and wind installations. The design of the CIS might differ on the basis of which of these sources is of greatest concern. If the transitional grid stability challenge is the dominant concern, a least-cost capacity mechanism might be more short-lived in nature and

be open to participation by existing coal and gas fired power stations. If the latter is the greatest concern, then there might be calls for the CIS to be more enduring. Given that these questions will only be resolved with time, there might be value in placing a five-year sunset clause on the proposed CIS and committing to an independent public review of the effectiveness of the CIS before deciding to extend it. That review could weigh the magnitude of ongoing costs of the CIS against the costs of potential grid disruption events in the future, and the extent to which the CIS has delivered greater grid stability at lower overall cost than price variability in wholesale electricity markets.

In the meantime, a least-cost CIS would be technology neutral, allowing both supply and demand side participation. While inclusion of the coal and gas fired power stations in the CIS appears to have been ruled out, it is possible that governments will weigh the merits of policy interventions aimed at extending the life of these generators. Inclusion of coal and gas fired power stations in the CIS would come with the benefit of providing some transparency around the cost of any such interventions. If they are not included, governments should be transparent about the value of any such support. In addition, when reviewing the effectiveness of the CIS, the grid stabilising effects of the CIS should be distinguished from the grid stabilising effects of interventions to extend the life of coal and gas fired power stations.



Recommendation 6.8

Pursue a least-cost approach to securing electricity supply

The proposed Capacity Investment Scheme should be implemented with a five-year sunset clause, and independently reviewed ahead of any decision to extend its life. It should be implemented on a technology neutral basis, allowing for both supply and demand-side participation by households and businesses.

4.7 Public support for research and development

There is a clear public policy case for government support of climate-change related research and development, particularly in frontier technologies where market failures are most relevant. As for any R&D support – whether to businesses, universities and other research bodies — clear criteria and transparent oversight are important, albeit recognising that failures at this early experimental stage are to be expected.

The case for public support of commercialisation of new technologies is generally weaker because, distinct from basic research, businesses are usually well placed to assess market risks and to capture the benefits. But where clear and consistent pricing of greenhouse emissions is absent, commercialisation of new low emissions technologies is made riskier and some government support may be appropriate. However, such contributions bring their own risks. Contributions should be transparent, and subjected to cost benefit analysis. In particular, it is important that governments have a mechanism to ‘move on’ once it becomes clear that a particular frontier technology is unlikely to meaningfully reduce long-term abatement costs (at least on a timeline that is relevant to climate policy) or indeed that the new technology has become commercial. Sunk costs should not determine whether funding continues. Mechanisms to prompt a ‘moving on’ from such technologies include making further funding conditional on the meeting of pre-defined progress thresholds and introducing formal institutional arrangements, such as sunset clauses, to allow reconsideration and assessment of the costs and benefits of additional funding.

Such an approach might prove useful for the hydrogen sector, which has received substantial investments from both Commonwealth and State Governments, and CCS technologies which have received the highest amount of public support to date (box 4.7). The efficiency of investment into CCS technologies that has

already taken place has been questioned by research institutions and public commentators (Browne and Swann 2017; Macdonald-Smith 2022a, 2022b; Turnbull 2017). However, irrespective of whether CCS makes a meaningful contribution to the pre-2050 abatement task, it may be important for the post-2050 ‘draw-down’ of excess atmospheric stocks of greenhouse gases (IEA 2021; IPCC 2022; Macdonald-Smith 2021).

Once a broad-based emissions abatement mechanism is in place, consistent with achieving targets, all projects utilising low emissions technologies, new or old, have a commercial advantage over emissions producing ones, thereby reducing the policy case for ongoing government support.

Box 4.7 – Public R&D support for abatement technologies

Government can play an important role in supporting research and development into new technologies when market failures constrain private activity. This role is strongest in the case of frontier technologies, where market failures are most pronounced. To date, Commonwealth and State Government investment has provided support for a range of emissions abatement technologies, including carbon capture and storage, and more recently, hydrogen.

Australian climate technology support

Level of Government	Technology	Value of assistance
Commonwealth	Hydrogen fuel	\$1 billion in direct Australian Government assistance (excluding CCS). ^a
	Future fuels and vehicles	\$2.1 billion ^b
	Large-scale energy storage	\$100 million ^c
	Ultra low-cost solar	Up to \$40 million ^d
	Carbon capture and storage	Between 2003 and 2017, the Government committed over \$3.5 billion to CCS and over \$1.3 billion was distributed. ^e More recently, the Government has invested over \$300 million to fund carbon capture, use and storage (CCS) projects and advance technologies, including establishing CCUS hubs near industrial areas. ^a
	Soil carbon	\$1.6 million ^f
New South Wales	Hydrogen fuel	\$70 million ^a
Victoria	Hydrogen fuel	\$10 million ^a
Tasmania	Hydrogen fuel	\$0.2 million ^a
Western Australia	Hydrogen fuel	\$47.5 million ^a

a. DISER (2021i, pp. 24, 34, 37, 40, 44). **b.** DISER (2021f, p. 10). **c.** ARENA (2022, pp. 3–4). **d.** ARENA (2022b). **e.** Browne and Swann (2017). **f.** Taylor (2022).

Appendix

A. Indirect carbon price estimation

This appendix details the methodology used to estimate the indirect carbon prices reported in volume 6. We use the term indirect carbon prices to refer to the fiscal cost of the policy per tonne of CO₂-e abatement. Our estimates can be thought of as similar to the implicit abatement subsidies estimated by the Commission previously (PC 2011). The indirect carbon prices listed in the chapter and detailed here are not meant to be exhaustive. There are many policies for which an indirect carbon price has not been estimated.

A.1 Fringe Benefits Tax exemption

The indirect carbon price associated with the policy to exempt electric vehicles (EVs) from Fringe Benefits Tax (FBT) ranges from \$987 to \$20 084, depending on the assumptions used in the estimation process.

When an employer makes a car available for an employee's private use they are liable to pay FBT. The taxable value is equal to the base value of the car, multiplied by the 'statutory percentage' (20%). This value is then grossed-up to reflect the gross salary employees would have to earn at the highest marginal tax rate (including Medicare levy) to pay for the benefits after paying tax (ATO 2019). Fringe benefits are taxed at the top marginal income tax rate (47%). Alternatively, when an employee acquires the car through a salary-sacrificing arrangement, the taxable value is not grossed-up and FBT is levied at that employee's marginal income tax rate (ATO 2021).

The *Treasury Laws Amendment (Electric Car Discount) Bill 2022* passed into law in December 2022. It exempts Battery Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV) from FBT. To be eligible for the exemption, the value of the car at the first retail sale must be below the Luxury Car Tax threshold for fuel efficient cars, which is currently set at \$84 916 (Chalmers 2022). The current eligibility of PHEV's under the scheme will sunset from 1 April 2025. The policy reduces the annual cost of leasing an EV for employees that choose to do so through a salary sacrifice package and for employers that choose to provide an EV for the private use of an employee. Though these savings are ultimately financed by the Australian community through foregone tax revenue collections.

Fiscal cost

The fiscal cost of the FBT exemption is based on Government estimates that a \$50 000 EV leased via a salary sacrifice arrangement would save employees \$4700 per annum (Chalmers 2022). This figure was then multiplied by 4 years, aligning with the assumed lease life used in the Parliamentary Budget Office (PBO) costing of the policy (PBO 2022), to arrive at an overall fiscal cost of \$18 800 per EV. This estimate is likely conservative, given that it assumed a \$50 000 electric vehicle and that the FBT exemption is available for EVs priced up to the LCT threshold for fuel efficient vehicles, currently set at \$84 916.

Emissions abatement

The emissions abatement resulting from this policy can be measured as the difference between emissions produced by the extra EVs that are purchased because of this policy and the average emissions of the vehicles that they replace. EV emissions are those emissions associated with the grid electricity required to charge the EV, factoring in the projected decarbonisation over the electricity grid over the period out to 2050 (more below). While some EV recharging stations are powered solely by renewable energy, and some EVs will be charged from homes and workplaces with onsite renewable generation capacity, this will not be universally the case. Moreover, in most cases, the use of onsite renewable energy to charge EVs would preclude the export of that renewable energy to the electricity grid, or lead to increased demand on the grid to source the electricity to provide for non-EV charging uses, that would have otherwise been supplied by the onsite renewable energy generation. Nevertheless, to identify the proportion of the indirect carbon price that is attributable to the emissions intensity of the electricity grid, we undertake a sensitivity test of our baseline indirect carbon price estimates by assuming that grid emissions are zero. These numbers are provided in brackets in table 4.2.

Emissions from internal combustion energy (ICE) powered cars arise come from the burning of liquid fossil fuels. The parameter values used in our estimate is the average emissions intensity of new passenger vehicles in 2021 and the average number of kilometres travelled by vehicles each year in 2018, the latest pre-COVID year for which data is available. The latest pre-COVID year was chosen given that widespread supply chain disruptions, lockdowns, and border closures likely contributed to the reduction in the average number of kilometres travelled by passenger vehicles in 2020. Broader lifecycle emissions, those generated throughout the supply chain in the process of manufacturing vehicles, were not considered.

To estimate the amount of abatement, the following parameters and assumptions were used (table A.1).

Table A.1 – Assumptions underpinning the emissions abatement estimate

Parameter	Description	Assumed value	Source
<i>km</i>	Average kilometres driven per year	12 600 km	ABS 2020
<i>EVefficiency</i>	Electricity consumption per kilometre	151 Wh/km	EV Database 2022
<i>ICEefficiency</i>	Emissions per kilometre	146.5 g/km	NTC 2022
<i>EF</i>	Emissions factor	See table A.2	
<i>A</i>	Additionality ^a	5–75%	
<i>BF</i>	Bring-forward ^b	3–13 years	

a. Additionality refers to the proportion of abatement — in this case the proportion of EVs — that would not have occurred in the absence of the policy. **b.** Bring-forward refers to the difference between when the car is acquired with the policy in place and when it would have been acquired in the absence of the policy.

The equation for calculating the amount of emissions abatement is as follows:

$$\text{Emissions Abatement} = \sum_{t=1}^{BF} (\text{ICEefficiency} - \text{EVefficiency} \times \text{EF}_t) \times \text{km} \times A$$

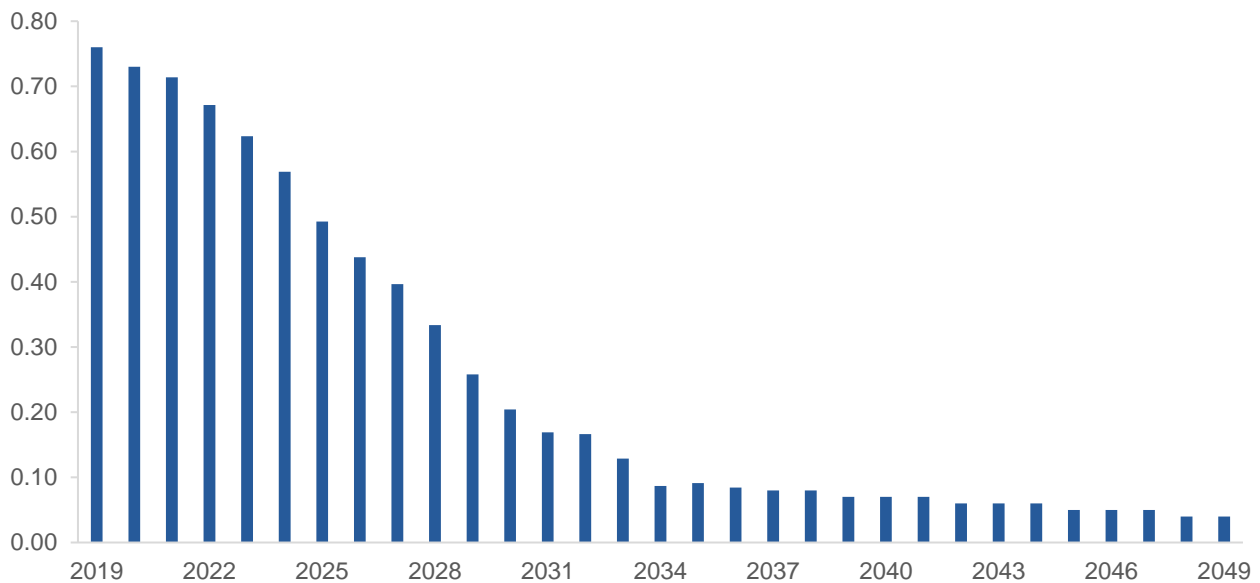
Underpinning the emissions abatement estimate is an assumption about how the emissions intensity of the electricity grid evolves over coming years. Our modelling used the development path AEMO viewed as most likely, *Progressive Change least-cost DP with actionable Marinus Link, and staged VNI West and HumeLink* (AEMO 2022). This development path is used to calculate the share of electricity generation coming from

renewable and non-renewable sources. In turn, these shares are used in a simple linear regression to estimate the emissions factor for each year until 2049-50:

$$\widehat{EF}_t = \widehat{\beta}_1 \text{ShareNonRenewables}_t$$

The emissions factor associated with consumption of purchased electricity or loss of electricity from the grid is forecast to fall from 0.73 in 2019-20 to 0.04 in 2049-50 (figure A.1).

Figure A.1 – Forecasted average emission factors for Australian electricity
Kilograms of CO₂-e per kilowatt hour



Source: Productivity Commission estimates using DISER (2021b); AEMO (2022).

Each EV taken up under the policy is assumed to last for 15 years. This reflects an assumption that after the 4-year lease term, the EV is sold into the used car market and thereby continues to generate emissions abatement relative to what would have otherwise been the case.

Assumptions about the degree of additionality and the degree of bring forward of EVs (ultimately) purchased through the policy are also relevant to the estimated abatement of the policy.

Additionality refers to the proportion of EVs demanded through the policy that would not have otherwise been demanded. An EV sourced through a salary sacrifice arrangement under the policy would not be additional if that EV would have otherwise been purchased or leased by that person without the FBT exemption, or purchased or leased by another individual, household, or business in Australia. If the policy supported non-additional demand for EVs then the abatement associated with that demand could not be attributed to the policy. Bring-forward is conditional on additionality and refers to the number of years that an additional EV leased as a result of the policy would have been brought forward from 2035, from when it is assumed that EVs will dominate the new car market and when an EV would have been sourced in the absence of the FBT exemption. This degree of bring-forward is relevant to the level of abatement that can be expected from an EV over its assumed 15-year life, given that the decarbonisation of the electricity grid will be less progressed the greater the bring-forward, and more progressed the lower the level of bring-forward.

The Commission has not sought to estimate the likely additionality or bring-forward elicited by the FBT exemption for EVs, but has sought to provide the reader with an indication of the indirect carbon price impacts

of a range of additionality and bring-forward assumptions. The lower bound indirect carbon price estimate assumed 75% additionality, meaning that 75% EV's leased under the FBT exemption would not have otherwise been purchased or leased in the absence of the FBT exemption. The upper bound estimate assumed only 5% additionality, relevant to a world in which supply side constraints will continue to be the dominant barrier to EV uptake in Australia (see box 4.4 for discussion). This range is not a forecast per se, but provides the reader with a sense of the indirect carbon price implications of key additionality assumptions. Bring-forward assumptions range from 13 years (from 2035-36 to 2022-23) to 3 years (from 2035-36 to 2032-33), reflecting an assumed 10-year life for the FBT exemption policy, aligning with the 10-year policy assumption used for policy costing purposes PBO (2022). While government has not set a time limit for the FBT exemption for battery electric vehicles, the 10-year life assumption is useful for constraining our range of 'bring-forward' assumptions. The lower bound indirect carbon price estimates includes a 3-year bring-forward assumption, while the upper bound includes a 13-year bring-forward assumption.

Finally, these estimates relate to Battery Electric Vehicles (BEV) only. Given that Plug-in Electric Vehicles (PHEVs) will be eligible for FBT exemption until 1 April 2025, and that they will continue to generate emissions while running off the ICE-based component of their engine, the 100% BEV assumption further acts to render these estimates conservative.

Bringing fiscal cost and emissions abatement together

The indirect carbon price associated with the policy was estimated on a per-unit basis and calculated according to the following formula:

$$\text{Implicit Carbon Price} = \frac{\text{Tax Foregone}}{\text{Emissions Abated}}$$

Our lower bound estimate of the indirect carbon price is \$987 per tonne of CO₂-e and the upper bound estimate is \$20 084 per tonne of CO₂-e.

Implications of assumptions about parameters

Conducting sensitivity analysis by adjusting the parameters helps illustrate which parameters most effect the estimated indirect carbon price. Some are far more important than others. Table A.2 shows the change in the indirect carbon price that occurs if each parameter is decreased by 10%. The baseline from which these effects are measured is the lower bound estimate, that is, additionality is assumed to be 75% and bring-forward is assumed to be 3 years.

What if grid emissions were zero?

Though our model allows for an increasing share of renewables in electricity generation over time, it assumes that the emissions intensity of non-renewable generation remains constant. This assumption is likely to bias upwards our estimate of the carbon price because gas, which is less emissions intensive than coal, is likely to make up a larger share of non-renewable generation in the future (AEMO 2022). The bias is likely to be small. Even if we assumed that emissions associated with electricity generation were zero — or equivalently, that all EVs are charged using renewable energy sources — which provides an absolute and unrealistic lower bound, the estimated indirect carbon price only falls by 8.3% in the case of the FBT exemption. If the emissions factor associated with consumption of purchased electricity or loss of electricity from the grid is 10% lower than forecast each year, the indirect carbon price would be 3.3% lower (table A.2).

Table A.2 – Effects of decreasing parameters by 10%

Parameter	Description	Effect of a 10% decrease on the estimated indirect carbon price (%)	Effect of a 10% decrease on the estimated indirect carbon price (\$/t)
<i>Value</i>	Value of the EV	-10.00	-99
<i>Lease</i>	Average lease period	-10.00	-99
<i>km</i>	Average kilometres driven per year	11.11	110
<i>VEfficiency</i>	Electricity consumption per kilometre	-3.30	-36
<i>ICEfficiency</i>	Emissions per kilometre	15.50	153
<i>EF</i>	Emissions factor	-3.30	-36
<i>A</i>	Additionality	7.48	74
<i>BF</i>	Bring forward	-4.66	50

What if the average lease length was not four years?

The estimation approach implicitly assumes an average lease length of four years. There is no change to the annual amount of fringe benefits tax payable for each of the first four years of a lease. Hence, reducing the average lease length by one year causes the estimate of the indirect carbon price to fall by 25%. In the fifth year of a lease, the base value of the car can be reduced by one third. Hence, increasing the average lease length by one year causes the estimate of the indirect carbon price to increase by 20%.

What if the typical EV cost more than \$50 000?

Our estimates implicitly assume a \$50 000 EV price, which is assumed in Treasury estimates of the financial impact of the policy (Chalmers 2022). However, there are currently very few EV models available in Australia for less than \$50 000. The recommended retail price for the entry-level model of Australia's highest selling EV — the Tesla Model 3 — is \$65 500. Using this figure instead increases the indirect carbon price by 30%. The threshold for being eligible for the FBT exemption is \$84 916, using this figure results in an indirect carbon price that is 69.8% higher than the indirect carbon price based on a \$50 000 EV. Alternatively, if the average EV price fell to \$40 000, the indirect carbon price would be 20% lower.

What if the average new ICE-powered vehicle is more efficient?

The base model assumes that the typical ICE-powered vehicle emits 146.5 g of CO₂-e per km. This was the average emissions intensity of new passenger vehicles in Australia in 2021. If the emissions intensity of new passenger vehicles was to fall to by 10%, the estimated indirect carbon price would increase by 15.5% at the lower bound.

A.2 State EV policies

The states also have a suite of policies designed to incentivise the uptake of EVs (table A.3). We have estimated indirect carbon prices for three types of policies — upfront subsidies or rebates, stamp duty exemptions or discounts and registration exemptions or discounts. The cost of each policy per EV has been

aggregated by state because the policies are complementary rather than exclusive. That is, buyers making use of one policy can also make use of the others. As with the estimates related to the FBT exemption, an EV value of \$50 000 has been assumed.

Table A.3 – State and Territory EV policies^{a,b}

State or Territory	Upfront subsidy or rebate	Stamp duty discount/exemption	Registration discount/exemption
New South Wales	\$3000	\$1600	-
Victoria	\$3000	-	\$100 per year
Queensland	\$3000	\$500	\$74.5 per year
South Australia	\$3000	-	\$138 per year for three years
Tasmania	-	\$2000	-

Sources: NSW Government (2022); DELWP (2021); Queensland Government (2022a, 2022b, 2022c) TCCO (2021); Department of Treasury and Finance (2022); Department for Energy and Mining (2022); Government of South Australia (2021); DWER (2021); Fisk (2021).

Upper and lower bound estimates of the indirect carbon price have been calculated in the same way as they were for the FBT exemption. The main difference is the minimum bring-forward dates, which have been set at the scheduled or likely end date (for quantity limited subsidies) for the highest value subsidy offered by the state or territory. For simplicity, the forecast emissions factors associated with consumption of purchased electricity or loss of electricity from the grid that were used were the same as those used to estimate the indirect carbon price associated with the FBT exemption. This effectively assumes that each state follows the same emissions reduction path within the electricity sector. While this is unlikely to be the case, changing this assumption would have only small effects for each state, particularly given that the listed states are linked to the NEM. The indirect carbon price associated with each state policy is high compared with other abatement measures but not as high as the indirect carbon price associated with the Commonwealth FBT exemption for EVs (box 4.2) because the tax expenditure is lower (table A.4), though the lower value of these concessions reinforces questions about the likely additionality of these policies.

Table A.4 – Indirect carbon prices for State and Territory EV policies

State or Territory	Cost over 15 years	Indirect carbon price (\$/tonne CO ₂ -e)
New South Wales	\$4600	\$271–4,914
Victoria	\$4500	\$287–4,807
Queensland	\$4617	\$282–4,933
South Australia	\$3414	\$209–3,647
Tasmania	\$2000	\$134–\$2,137

Source: Productivity Commission estimates.

A.3 Fuel excise discounts

Domestically produced ethanol and biodiesel attract discounted rates of excise duty and composite fuels made using ethanol and biodiesel have a lower emissions intensity (table A.5).

Table A.5 – Excise rates and emissions intensities for fuels

	Excise rate ^a	Scope 1 emissions intensity (kg/CO ₂ -e/litre)	Lifecycle emissions intensity (kg/CO ₂ -e/litre)
Petrol	0.442	2.38	3.02
Ethanol	0.145	0.06	1.94 ^b
E10	0.412	2.15	2.91
Diesel	0.442	2.72	2.92
Biodiesel	0.088	0.09	0.60
B20	0.371	2.19	2.46

a. Discounted excise rates apply only to domestically produced ethanol and biodiesel. **b.** Lifecycle emissions intensity estimates for ethanol were calculated using a weighted average of lifecycle emissions of wheat, sorghum and molasses because an estimate for the lifecycle emissions intensity of barley, which accounts for 9% of ethanol production in Australia, was not available.

Sources: Productivity Commission estimates based on DISER (2021b); PC (2011); PC (2022); USDA (2020).

The indirect carbon price associated with the discounted rates of excise duty can be estimated as follows:

$$\frac{EX_p - EX_e}{EM_p - EM_e} \times 1000$$

$$\frac{EX_d - EX_b}{EM_d - EM_b} \times 1000$$

where:

- EX_p indicates the excise rate for petrol
- EX_e indicates the excise rate for ethanol
- EX_d indicates the excise rate for diesel
- EX_b indicates the excise rate for biodiesel
- EM_p indicates the emissions intensity for petrol
- EM_e indicates the emissions intensity for ethanol
- EM_d indicates the emissions intensity for diesel
- EM_b indicates the emissions intensity for biodiesel.

The scope 1 emissions intensity was used to estimate a lower bound, while the lifecycle emissions intensity was used to estimate an upper bound. The estimated indirect carbon price for E10 is \$127.91–273.66 and for B20 is \$134.55–152.02 (table A.6).

Table A.6 – Indirect carbon prices for biofuels

	Indirect price (scope 1 emissions)	Indirect price (lifecycle emissions)
E10	127.92	273.65
B20	134.55	152.02

Source: Productivity Commission estimates.

A.4 Renewable energy target

The renewable energy target (RET) has two components, the large-scale renewable energy target, backed by large-scale generation certificates (LGCs) and the small-scale renewable energy scheme, backed by small-scale technology certificates (STCs). The RET aimed to achieve 33 000 gigawatt hours of additional electricity from large-scale renewable sources by 2020 — equivalent to 20% of energy supply. That target was reached in September 2019 and is now being maintained through until 2030.

This section estimates the indirect prices associated with the RET up until 2020. The period after 2020 is not considered because — with the target having already been met — it is unlikely that new generation could be considered additional. The Commission (2011) has previously estimated the indirect price — or indirect abatement subsidy — associated with both the LGC and STC schemes.

Large-scale generation certificates

The Commission (2011) estimated the indirect carbon price associated with LGCs using both the ‘spot’ price (\$37.03 at the time) and the long-term contract price. The long-term contract price was not readily available and hence was estimated as the price needed to induce wind generation to enter the market (\$60).

Since then the economics of electricity generation have changed, with renewables now having a lower levelised cost of energy than coal (Bleich and Guimaraes 2016, p. 6). This finding is also true domestically, with each of CSIRO’s GenCost reports identifying renewables as the lowest cost ‘new build’ (Graham et al. 2018, 2020, 2021, 2022). Consequently, we have adjusted our methodology and only estimated indirect carbon prices based on the ‘spot’ price. As of 5 September 2022 the price of an LGC was \$59.50 (Northmore Gordon 2022).

The Commission (2011) used three emissions intensity factors to estimate a range of indirect prices. The average emissions intensity of the grid (0.92) was used for the central estimate, while the weighted-average emissions intensity factor for coal generation (1.00) was used for the lower bound estimate and the emissions intensity factor for gas generation (0.54) was used for the upper bound estimate.

Currently, the average emissions intensity factor of the non-renewable component of the grid is 0.87. The weighted-average emissions intensity factor of coal generation is 0.99 and the emissions intensity factor for gas is 0.54. The emissions intensity factor of the non-renewable component has decreased because gas makes up a larger share than it did in 2011. The emissions intensity factor of coal generation has decreased because black coal makes up a larger share of coal production relative to brown coal than in 2011.

The indirect carbon prices are calculated using the following formula:

$$\frac{LGC\ Price}{Emissions\ Factor}$$

The central estimate is \$68 per tonne of CO₂-e, with a range of \$60–110.

Additionality

The Commission (2011) took the view that all LGCs were additional — that is, the renewable energy generation would not have occurred in the absence of the policy — because, at the time, the cost of renewable energy generation was far greater than the non-renewable generation. That is no longer the case. The cost of renewables has fallen faster and further than expected and as of 2016 was less than the cost of fossil fuel generation (Bleich and Guimaraes 2016, p. 6; Graham et al. 2018, 2020, 2021, 2022). Hence, it is likely that not all renewable energy generation installed after 2016 was additional. That is, some of the generation installed would likely have been installed even in the absence of LGCs.

In 2016, approximately 17 500 gigawatt-hours of renewable energy that counted towards the large-scale component of the RET was generated — 53% of the 2020 target (CEC 2017). Taking the extreme view that none of the generation installed after 2016 was additional, we can calculate a lower bound estimate of additionality. If the additionality of LGCs was only 50%, the estimated indirect carbon price would rise by 100% to \$136, with a range of \$120–220.

Small-scale technology certificates

STCs differ to LGCs in that certificates accounting for 15 years' worth of abatement (fewer years if the technology was installed post-2016) were created upfront and those certificates could be sold to retailers immediately. This policy can be thought of as a capital subsidy. The subsidy equivalent has been estimated as equal to what it would have cost a private actor to fund investment in the technology in the absence of the policy. To estimate an indirect carbon price it is best to think in annual terms, hence the cost of the policy has been transformed into equivalent annual cost terms. This conversion relies on the following formula:

$$\frac{STC_t \times P_t^{STC}}{1 - (1 + \delta)^{-n}}$$

where:

- STC_t refers to the number of certificates issued in year t
- P_t^{STC} refers to the price of STCs in year t
- δ refers to the discount factor
- n refers to the economic life of the asset.

The Commission (2011) used three discount factors (3%, 7% and 11%) as well as varying the emissions intensity of the electricity replaced (as described above) to estimate a range for the indirect carbon price. We have adopted the same approach and used the 2015 STC data to inform our estimates (table A.7).

Table A.7 – STC indirect prices

Discount rate	Lower bound	Central estimate	Upper bound
3%	\$41	\$46	\$75
7%	\$57	\$65	\$105
11%	\$76	\$86	\$139

Sources: Productivity Commission estimates based on Clean Energy Regulator (2022b, 2022a); PC (2011); Northmore Gordon (2022).

The generation eligible for STCs was not wholly additional because of overlaps with state and territory feed-in-tariffs. The state and territory policies affected the indirect carbon price of solar photovoltaic generation specifically (PC 2011, p. 83). This issue has not been addressed in these estimates.

Of all STCs created between 2011 and 2020, 43% were issued after 2016. Hence, and to be consistent with our LGC estimates, we have used an additionality parameter of 50% to provide a lower bound for the indirect price associated with STCs. Doing so increases the estimated indirect carbon price by 100%. That is, the central estimate using a 7% discount rate is \$129, with a range of \$114–209.

A.5 NSW Energy Savings Scheme

The NSW energy savings scheme requires certain entities to obtain and surrender energy savings certificates (ESC). Certificates represent one notional megawatt hour (MWh) (Kean 2022). Accredited certificate providers receive certificates in accordance with the following formula:

$$\begin{aligned} \text{Number of certificates} &= \sum(\text{electricity savings} \times \text{electricity conversion factor} \\ &+ \text{gas savings} \times \text{gas certificate conversion factor}) \end{aligned}$$

The indirect price estimated reflects electricity savings only. It is calculated as the penalty rate, which reflects the upper bound for covered entities, divided by the emissions intensity factor and multiplied by the electricity conversion factor (1.06) to transform the price into dollars per tonne of CO₂-e.

$$\text{Indirect Carbon Price} = \frac{\text{Penalty Rate}}{\text{Emissions Factor}} \times \text{Electricity Conversion Factor}$$

Similar to previous estimates, our estimates consider only scope two emissions and three intensity factors were used to estimate a range of indirect carbon prices: the average emissions intensity of electricity generation in New South Wales, which represented a central estimate and then the emissions intensity of coal generation (an upper bound) and the emissions intensity of gas generation (a lower bound). The emissions intensity factor for coal generation is 0.99 and resulted in a indirect price of \$32 per tonne. The average emissions intensity factor for electricity generation in New South Wales in 2019-20 was 0.78 and equated to an indirect price of \$41 per tonne (DISER 2021b). The average emissions intensity factor for gas production is 0.54 and equated to an indirect price of \$59 per tonne.

Victoria has a similar system where certain entities are required to purchase Victorian energy efficiency certificates (VEECs). VEECs are measured in tonnes of CO₂-e, hence, no transformation is required. As of 5 September, one VEEC cost \$69 in the spot market (Northmore Gordon 2022). It is possible that the long-term contract price is lower than the 'spot' price.

Abbreviations

ACCU	Australian Carbon Credit Unit
AEMO	Australian Energy Market Organisation
BEV	Battery Electric Vehicle
CIS	Capacity Investment Scheme
CBAM	Carbon Border Adjustment Mechanism
CBT	Carbon Border Tariff
CCS	Carbon Capture and Storage
CO₂	Carbon dioxide
CO₂-e	Carbon dioxide equivalent
CPM	Carbon Pricing Mechanism
CER	Clean Energy Regulator
EU	European Union
EITEI	Emissions-Intensive Trade-Exposed Industry
ERF	Emissions Reduction Fund
ETS	Emissions Trading Scheme
EV	Electric Vehicle
FBT	Fringe Benefits Tax
ICE	Internal Combustion Engine
ISP	Integrated System Plan
LGC	Large Scale Generation Certificate
Mt	Megatonne
NEM	National Electricity Market
NGERS	National Greenhouse and Energy Reporting Scheme
PHEV	Plug-in Hybrid Electric Vehicle
RET	Renewable Energy Target
SM	Safeguard Mechanism
STC	Small Scale Technology Certificate
VEEC	Victorian Energy Efficiency Certificate
VPP	Virtual Power Plant

References

- ABS (Australian Bureau of Statistics) 2020, *Survey of Motor Vehicle Use, Australia, 12 Months ended 30 June 2020*, <https://www.abs.gov.au/statistics/industry/tourism-and-transport/survey-motor-vehicle-use-australia/latest-release> (accessed 22 July 2022).
- ACT Government 2022a, *Cars and vehicles*, <https://www.climatechoices.act.gov.au/transport-and-travel/cars-and-vehicles> (accessed 21 July 2022).
- 2022b, *Grant funding for public charging stations*, <https://www.climatechoices.act.gov.au/transport-and-travel/cars-and-vehicles/grant-funding-for-public-charging-stations> (accessed 21 July 2022).
- 2022c, *The future of ZEVs*, <https://www.climatechoices.act.gov.au/transport-and-travel/cars-and-vehicles/the-future-of-zevs> (accessed 21 July 2022).
- AEMO (Australian Energy Market Operator) 2022, *2022 Integrated System Plan*, 30 June.
- AER (Australian Energy Regulator) 2022, *AER sets energy price cap to protect consumers*, Media Release, 26 May.
- ATO (Australian Taxation Office) 2019, *Calculating your FBT*, [https://www.ato.gov.au/general/fringe-benefits-tax-\(fbt\)/calculating-your-fbt/](https://www.ato.gov.au/general/fringe-benefits-tax-(fbt)/calculating-your-fbt/) (accessed 6 September 2022).
- 2021, *Car fringe benefits tax (FBT) guide for small business*, [https://www.ato.gov.au/Business/Bus/Car-fringe-benefits-tax-\(FBT\)-guide-for-small-business/](https://www.ato.gov.au/Business/Bus/Car-fringe-benefits-tax-(FBT)-guide-for-small-business/) (accessed 6 September 2022).
- Australian Renewable Energy Agency 2022a, *Large Scale Battery Storage Funding Round Expression of Interest Full Application Stage*, <https://arena.gov.au/assets/2021/12/large-scale-battery-storage-funding-round-expression-of-interest-full-application-stage.pdf> (accessed 15 September 2022).
- 2022b, *Ultra Low Cost Solar PV Funding Announcement*, <https://arena.gov.au/assets/2022/01/ultra-low-cost-solar-pv-funding-announcement.pdf> (accessed 15 September 2022).
- Bleich, K. and Guimaraes, R.D. 2016, *Renewable Infrastructure Investment Handbook: A Guide for Institutional Investors*, December, World Economic Forum.
- Buis, A. 2019, *The Atmosphere: Getting a Handle on Carbon Dioxide*, 9 October, NASA.
- Bowen, C. 2023, *Government welcomes Independent Review of ACCUs*, Media Release, 9 January.
- Browne, B. and Swann, T. 2017, *Money for nothing*, May, The Australia Institute, Canberra.
- Bruyere, C.L., Buckley, B., Jaye, A.B., Done, J., M., Lepastrier, M., Aldridge, J., Chan, P., Towler, E. and Ge, M. 2022, 'Using large climate model ensembles to assess historical and future tropical cyclone activity along the Australian east coast', *Weather and Climate Extremes*, vol. 38.
- Camara, Y., Holtmark, B. and Misch, F. 2021, *Electric Vehicles, Tax Incentives and Emissions: Evidence from Norway*, 8 June, International Monetary Fund.
- Canadell, J.G., Meyer, C.P., Cook, G.D., Dowdy, A., Briggs, P.R., Knauer, J., Pepler, A. and Haverd, V. 2021, 'Multi-decadal increase of forest burned area in Australia is linked to climate change', *Nature Communications*, vol. 12, no. 6921.
- CEC (Clean Energy Council) 2017, *Clean Energy Australia Report 2016*.
- CER (Clean Energy Regulator) 2022, *Sectoral baseline*, <https://www.cleanenergyregulator.gov.au/NGER/The-safeguard-mechanism/Baselines/Sectoral-baseline> (accessed 19 September 2022).
- Chalmers, J. 2022, *Treasury Laws Amendment (Electric Car Discount) Bill 2022 - Second Reading*.
- Chubb, I., Bennett, A., Gorring, A. and Hatfield-Dodds, S. 2022, *Independent Review of ACCUs*, December, Department of Climate Change, Energy, the Environment and Water.
- Clean Energy Regulator 2022a, *Register of small-scale technology certificates*, <https://www.rec-registry.gov.au/rec-registry/app/public/stc-register> (accessed 5 September 2022).
- 2022b, *Small-scale Renewable Energy Scheme*, <https://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target/How-the-scheme-works/Small-scale-Renewable-Energy-Scheme> (accessed 5 September 2022).
- CSIRO 2020, *State of The Climate 2020*.
- 2021, *Maintaining sustainable fisheries in a changing climate*, CSIRO, <https://www.csiro.au/en/research/natural-environment/oceans/marine-climate-responses/fisheries-and-climate-change> (accessed 15 September 2022).
- and BOM (CSIRO) 2022, *State of the Climate 2022*, Commonwealth Scientific and Industrial Research Organisation.
- DCCEEW (Department of Climate Change, Energy, the Environment and Water) 2023, *Position Paper: Safeguard Mechanism Reforms*, January.
- DELWP (Department of Environment, Land, Water and Planning) 2021, *Zero emissions vehicles*, <https://www.energy.vic.gov.au/renewable-energy/zero-emissions-vehicles> (accessed 21 July 2022).
- DEM (Department for Energy and Mining) 2022, *Statewide charging network*, <https://www.energymining.sa.gov.au/industry/modern-energy/electric-vehicles/statewide-charging-network> (accessed 21 July 2022).
- Demand Manager 2022, *Certificate Prices*, <https://www.demandmanager.com.au/certificate-prices/> (accessed 30 August 2022).
- Department of Industry, Science, Energy and Resources 2021, *State of Hydrogen 2021*, Australian Government Department of Industry, Science, Energy and Resources, Canberra, Australian Capital Territory.
- Department of Infrastructure, Planning and Logistics 2021, *Northern Territory Electric Vehicle Strategy and Implementation Plan 2021–2026*, 20 July, Darwin.
- Department of Treasury and Finance 2022, *Incentives for electric vehicles*, <https://www.treasury.sa.gov.au/Growing-South-Australia/incentives-for-electric-vehicles> (accessed 21 July 2022).
- DIPL (Department of Infrastructure, Planning and Logistics) 2022, *Electric vehicle strategy and implementation plan*,

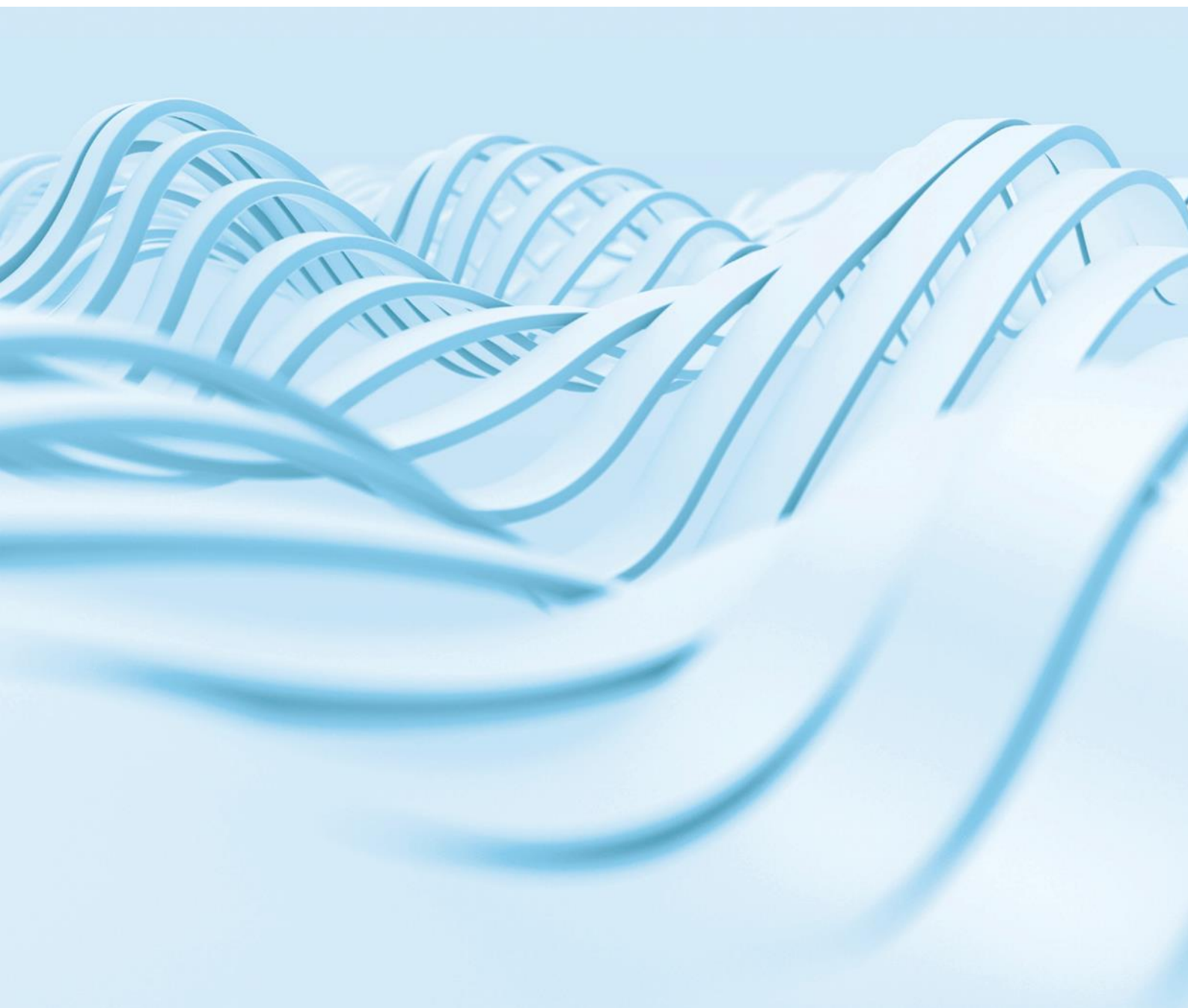
- <https://dipl.nt.gov.au/strategies/electric-vehicle> (accessed 21 July 2022).
- DISER (Department of Industry, Science, Energy and Resources) 2021a, *Future fuels and vehicles strategy*, November.
- 2021b, *National Greenhouse Accounts Factors*, August.
- DoT (Department of Transport) 2022, *Zero Emission Vehicle (ZEV) Rebate*, <https://www.transport.wa.gov.au/projects/zero-emission-vehicle-zev-rebate.asp> (accessed 21 July 2022).
- DWER (Department of Water and Environmental Regulation) 2021, *Electric Vehicle Strategy*, <https://www.wa.gov.au/service/environment/environment-information-services/electric-vehicle-strategy> (accessed 21 July 2022).
- ESB (Energy Security Board) 2022, *Capacity mechanism: High-level Design Paper*, June.
- European Commission nd, *Carbon leakage*, https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/carbon-leakage_en (accessed 15 September 2022).
- EV Council (Electric Vehicle Council) 2022, *State of Electric Vehicles*, March.
- EV Database 2022, *Energy consumption of full electric vehicles*, <https://ev-database.org/cheatsheet/energy-consumption-electric-car> (accessed 12 August 2022).
- FCAI (Federal Chamber of Automotive Industries) 2023, *FCAI releases 2022 new car sales data*, 5 January.
- Fearon, T. 2022, *Australia's carbon market a 'fraud on the environment'*, <https://law.anu.edu.au/news-and-events/news/australia%E2%80%99s-carbon-market-fraud-environment> (accessed 26 August 2022).
- Fisk, K. 2021, *Australia's EV policies: What's happening in each state and territory in 2021 – Updated*, <https://www.whichcar.com.au/news/australian-states-territories-ev-policies-september-2021> (accessed 21 July 2022).
- Fournel, J.-F. 2022, *Electric Vehicle Subsidies: Cost Effectiveness and Emissions Reduction*, January.
- Freebairn, J. 2022, 'Economic Problems with Subsidies for Electric Vehicles', *Economic Papers*, vol. 41, no. 4.
- Garnaut, R. 2008, *Garnaut Climate Change Review - Final Report*.
- Graham, P.W., Hayward, J., Foster, J. and Havas, L. 2020, *GenCost 2019-20*, CSIRO.
- , —, — and — 2021, *GenCost 2020-21: Final Report*, June, CSIRO.
- , —, — and — 2022, *GenCost 2021-22: Final Report*, July, CSIRO.
- , —, —, Story, O. and Havas, L. 2018, *GenCost 2018*, CSIRO.
- Hague, B., Jones, D., Jakob, D. and McGregor, S. 2022, 'Australian Coastal Flooding Trends and Forcing Factors', *Earth's Future*, vol. 10, no. 2.
- Hardy, M., Fitzsimons, J., Bekessy, S.A. and Gordon, A. 2017, 'Exploring the Permanence of Conservation Covenants', *Conservation Letters*, vol. 10, no. 2.
- Hochman, Z., Gobbett, D. and Horan, H. 2017, 'Climate trends account for stalled wheat yields in Australia since 1990', Blackwell Publishing, <https://publications.csiro.au/rpr/pub?list=SEA&pid=csiro:EP163335> (accessed 15 September 2022).
- Hughes, N., Lu, M., Soh, W.Y. and Lawson, K. 2022, 'Modelling the effects of climate change on the profitability of Australian farms', *Climatic Change*, vol. 172, no. 1, p. 12.
- Humphrys, E., Newman, F. and Goodman, J. 2020, *Heat Stress and Work in the Era of Climate Change*, November, The Australia Institute, https://d3n8a8pro7vhmx.cloudfront.net/theaustralianinstitute/pages/3235/attachments/original/1605114522/Heat_Stress_and_Work_FINAL_FINAL.pdf?1605114522 (accessed 14 September 2022).
- ICA (Insurance Council of Australia) 2022, *Climate change action*, <https://insurancecouncil.com.au/issues-in-focus/climate-change-action/> (accessed 20 July 2022).
- IEA (International Energy Agency) 2020a, *Going carbon negative: What are the technology options?*
- 2020b, *Implementing Effective Emissions Trading Systems*, Paris, <https://www.iea.org/reports/implementing-effective-emissions-trading-systems/ets-in-industry> (accessed 19 September 2022).
- 2021, *Carbon capture, utilisation and storage - Fuels & Technologies*, <https://www.iea.org/fuels-and-technologies/carbon-capture-utilisation-and-storage> (accessed 23 August 2022).
- 2022, *Global Electric Vehicle Outlook 2022*, May, IEA, Paris.
- IPCC (Intergovernmental Panel on Climate Change) 2022, *Working Group III contribution of the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*.
- Johansson, D.J.A., Azar, C., Lehtveer, M. and Peters, G.P. 2020, 'The role of negative carbon emissions in reaching the Paris climate targets: The impact of target formulation in integrated assessment models', IOP Publishing, *Environmental Research Letters*, vol. 15, no. 12, p. 124024.
- Kean, M. 2022, *Energy Savings Scheme (Amendment No. 1) Rule 2022*.
- Macdonald-Smith, A. 2021, 'Carbon capture and storage "has to work" to reach net zero', *Australian Financial Review*, 17 November.
- 2022a, 'Australia "missed big opportunity in CCS": IEA head', *Australian Financial Review*, 15 July.
- 2022b, "'Can't be held to ransom on renewables'", *Australian Financial Review*, 12 July.
- Macintosh, A. 2022, *The Emissions Reduction Fund's Landfill Gas Method: An Assessment of its Integrity*, 16 March, The Australian National University, Canberra.
- , Butler, D. and Ansell, D. 2022, *Measurement Error in the Emissions Reduction Fund's Human-induced Regeneration (HIR) Method*, 14 March, The Australian National University, Canberra.
- , —, — and Waschka, M. 2022a, *Integrity Problems with the ERF's 2022 Plantation Forestry Method*, 12 August, The Australian National University, Canberra.
- , — and Evans, M.C. 2022, 'We blew the whistle on Australia's central climate policy. Here's what a new federal government probe must fix', *The Conversation*.
- , —, —, Larraondo, P.R., Ansell, D. and Gibbons, P. 2022b, *The ERF's Human-induced Regeneration (HIR): What the Beare and Chambers Report Really Found and a Critique of its Method*, 16 March, The Australian National University, Canberra.
- Mallon, K., McKinlay, M., Houghton, N., Hamden, R., Tedder, R. and Lamb, J. 2019, *Climate Change Risk to Australia's Built Environment*, October, XDI, <https://xdi.systems/wp-content/uploads/2019/10/Climate-Change-Risk-to-Australia%E2%80%99s-Built-Environment-V4-final-reduced-2.pdf> (accessed 14 September 2022).

- Martin, P. 2022, 'Weak Emission Standards and Australia's Low Takeup of Electric Vehicles', *Economic Papers*, vol. 41, no. 4, pp. 390–395.
- Northmore Gordon 2022, *Certificate Prices*, <https://northmoregordon.com/certificate-prices/> (accessed 5 September 2022).
- NSW Government 2022, *NSW Electric Vehicle Strategy*, <http://www.environment.nsw.gov.au/topics/climate-change/net-zero-plan/electric-vehicle-strategy> (accessed 21 July 2022).
- NTC (National Transport Commission) 2022, *Carbon Dioxide Emissions Intensity for New Australian Light Vehicles 2021*, 15 September, National Transport Commission.
- Nunes, A., Woodley, L. and Rossetti, P. 2022, 'Re-thinking procurement incentives for electric vehicles to achieve net-zero emissions', *Nature Sustainability*, vol. 5.
- OECD 2016, *Biodiversity Offsets: Effective Design and Implementation*, Organisation for Economic Co-operation and Development.
- Ortiz-Bobea, A., Ault, T.R., Carrillo, C.M., Chambers, R.G. and Lobell, D.B. 2021, 'Anthropogenic climate change has slowed global agricultural productivity growth', Nature Publishing Group, *Nature Climate Change*, vol. 11, no. 4, pp. 306–312.
- PBO (Parliamentary Budget Office) 2022, *Powering Australia - Electric Car Discount*.
- PC (Productivity Commission) 2009, *Government Drought Support*, Report no. 46, Canberra.
- 2011, *Carbon Emission Policies in Key Economies*, Research Report, Canberra.
- 2022, *Trade and Assistance Review 2020-21*, Annual Report Series, Canberra.
- Queensland Government 2022a, *Queensland's Electric Super Highway*, <https://www.qld.gov.au/transport/projects/electricvehicles/super-highway> (accessed 21 July 2022).
- 2022b, *Queensland's new Zero Emission Vehicle Strategy*, <https://www.qld.gov.au/transport/projects/electricvehicles/zero-emission-strategy> (accessed 21 July 2022).
- 2022c, *Shifting to zero emission vehicles*, <https://www.qld.gov.au/transport/projects/electricvehicles/hitting-the-road> (accessed 21 July 2022).
- Reinhard, J. and Lefebvre, M. 2022, *The Cost of Extreme Weather*, September, The Mckell Institute, <https://mckellinstitute.org.au/research/reports/the-cost-of-extreme-weather-1/> (accessed 19 September 2022).
- Reputex 2021, *The Economic Impact of the ALP's Powering Australia Plan - Summary Report*, https://www.reputex.com/wp-content/uploads/2021/12/REPUTEX_The-economic-impact-of-the-ALPs-Powering-Australia-Plan_Summary-Report-1221-2.pdf (accessed 15 September 2022).
- Reputex Energy 2019, *The Cost of Net-Zero Emissions Under Paris: A Marginal Abatement Cost (MAC) curve for Australia*, July.
- South Australian Government 2021, *South Australia's electric vehicle action plan*, July.
- Talberg, A. and Swoboda, K. 2013, 'Emissions trading schemes around the world', p. 32.
- Taylor, A. 2022, *New investment in innovative Australian soil carbon measurement technology*, <https://www.minister.industry.gov.au/ministers/taylor/media-releases/new-investment-innovative-australian-soil-carbon-measurement-technology> (accessed 15 September 2022).
- TCCO (Tasmanian Climate Change Office) 2021, *Supporting electric vehicle uptake*, Fact Sheet.
- Turnbull, M. 2017, *Address at the National Press Club and Q&A*, <https://www.malcolmturnbull.com.au/media/address-at-the-national-press-club-and-qa-canberra> (accessed 12 August 2022).
- USDA (United States Department of Agriculture) 2020, *Biofuels Annual*, 16 July, United States Department of Agriculture, Canberra.
- Visser, J.B., Wasko, C., Sharma, A. and Nathan, R. 2022, 'The Impact of Climate Change on Operational Probable Maximum Precipitation Estimates', *Water Resources Research*, vol. 58, no. 11.
- van Vuuren, D.P., Deetman, S., van Vliet, J., van den Berg, M., van Ruijven, B.J. and Koelbl, B. 2013, 'The role of negative CO₂ emissions for reaching 2°C — insights from integrated assessment modelling', *Climatic Change*, vol. 118, no. 1, pp. 15–27.
- Zhou, C., Zelinka, M.D., Dessler, A.E. and Wang, M. 2021, 'Greater committed warming after accounting for the pattern effect', Nature Publishing Group, *Nature Climate Change*, vol. 11, no. 2, pp. 132–136.



5-year Productivity Inquiry: A more productive labour market

Inquiry report – *volume 7*



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The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

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ISSN 1447-1337 (online)

ISSN 1447-1329 (print)

ISBN 978-1-74037-759-1 (set)

ISBN 978-1-74037-766-9 (volume 7)

An appropriate reference for this publication is:

Productivity Commission 2023, *5-year Productivity Inquiry: A more productive labour market*, Vol. 7, Inquiry Report no. 100, Canberra

Publication enquiries:

Media, Publications and Web | phone 03 9653 2244 | email publications@pc.gov.au

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The Commission’s report is divided into 9 volumes: an overview document (volume 1) that presents our policy agenda, and inquiry content volumes (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda, including a modelling appendix. The full report is available from www.pc.gov.au.

Preface

A well-functioning labour market is critical to productivity growth and social wellbeing.

At a conceptual level, this relationship is simple: the easier it is for firms to meet their skill needs and employ productive work practices, the better they are placed to respond to commercial opportunities, innovate, adopt technology and improve asset utilisation. And the more firms compete for productive workers, the more people can find work, move jobs, upskill, and receive better pay and conditions.

But the reality of achieving these objectives — particularly in an advanced and dynamic economy — is much more complex. Labour market policy involves a unique set of economic, ethical and social challenges. It exists within the context of a unique regulatory framework — a product of history as much as design.

Policy must also reflect prevailing conditions. Full employment is a welcome development but presents challenges in the immediate term. It highlights the importance of having people in jobs that best use their skills and expertise at a time when people are changing jobs less often.

Reforms could provide broad and enduring gains within a challenging and volatile landscape.

First, increasing the **supply of appropriately skilled workers** will be key, as will improving **matching between skilled workers and jobs in the labour market**.

- Education and training play a significant role in ensuring that students obtain skills that are valued in the labour market (discussed in volume 8).
- Skilled migration makes a strong contribution to productivity through an inflow of skills, ideas, and innovation into the labour market. The composition of the migrant intake could be better targeted to avoid mismatches between skills and labour market needs, and to improve the fiscal impacts of skilled migration.
- Occupational licensing, while playing an important role in setting minimum standards for training and experience, also restricts skilled labour supply if settings are overly stringent.

Second, productivity will improve where businesses are able to introduce **innovative and efficient work practices that enhance the value of employees**. As more **employers compete for more productive workers**, wages rise and resources flow to more productive areas of the economy.

- The workplace relations system can be improved to support innovation and better job-matching within enterprises. Making modern awards simpler, more flexible and streamlined would not only reduce compliance costs and the scope for non-compliance but also foster innovation. Removing barriers to effective agreement-making would generate productivity gains through efficient labour use and innovation.
- Platform-based business models can contribute to productivity growth, including through new and more efficiently delivered services. Fit-for-purpose safety and other measures would support gig workers without stymying the benefits of the business model.
- In the context of occupational licensing, scope of practice settings that are unduly restrictive can prevent workers from applying the full extent of their skills and capabilities.

1. Improving productivity in a challenging labour market

Key points

- * **A well-functioning labour market is a critical contributor to productivity growth, particularly through the matching of jobs and people with appropriate skills and know-how.**
 - The quality of skills and the matching of skills and jobs in the labour market are essential for productivity and economic growth. Where policy levers influence labour supply — such as in migration policy, or restrictions associated with licensing — the composition of the labour force and the quality of skills are more directly relevant to productivity than the size of the increase in participation.
 - The effect of participation on productivity is complex, and is driven, in part, by the skills composition of new labour market participants. Removing barriers or disincentives to labour supply can contribute to productivity growth if it leads to better jobs and skills matching by expanding the pool of available skills.
- * **Productivity is also dependent on efficient work practices and the movement of higher performing workers to more productive firms.**
 - The decline in job mobility is likely due to a number of factors, including dynamism in product markets, demographic change, and worker preferences.
 - The design of the workplace relations (WR) system can affect many factors directly relevant to productivity — investment, wages, decisions about how to organise firms, and the degree of competition between employers in the labour market.

This chapter describes some of the key challenges for governments arising from today's labour market, including the matching of skills and jobs in the labour market; and the productive use of skills and labour resources. It then provides a guide to the remaining chapters of this volume.

1.1 The matching and use of skills in the labour market

The efficiency of the supply and matching of skills and jobs in the labour market is critical for productivity. The more easily firms are able to meet their skill needs, the more easily they can respond to commercial opportunities and improve asset utilisation. This requires appropriate skills to be available in the economy — a function of education, on-the-job training, migration, and workforce participation.

Productivity also depends on the movement of people between jobs — to higher performing firms or tasks within firms, to jobs in different locations or to jobs that better match their skillset and capabilities. In a

competitive labour market, more productive employers would compete for skills and talent in the labour market by raising wages, thereby allocating labour resources to their most productive use.

It is also important that firms are able to employ efficient work practices so that employees' capabilities are used to their full extent.

Labour productivity and participation

The productivity of labour has played a dominant role in driving real increases to income levels over the past 60 years (figure 1.1). Increasing labour utilisation — which measures the effect of workforce participation, unemployment and average working hours — also played a significant role in driving income levels in the 1960s and 1980s, as did a rising terms of trade, driven by global demand for commodities during the mining boom. But neither has made as sustained a contribution as labour productivity growth.

Trends in labour productivity and workforce participation reflect the transformation of Australia's labour market. Since 1970, Australia's employment to population ratio has moved from below the average to above the average in the OECD, rising to 51% in 2019, primarily due to an increase in the participation of women in the workforce over the past 40 years. Despite a net increase in participation, on a per capita basis, employed Australians work 10% fewer hours (a decline of four hours per day) compared with 50 years ago.

One implication is that if productivity growth is slow, the associated drag on economic growth could theoretically be offset by increases in labour supply. However, sustaining an ever-increasing share of people in the workforce (and maintaining their income levels), is neither possible nor desirable. People value leisure and there are many unpaid activities that are socially valuable.

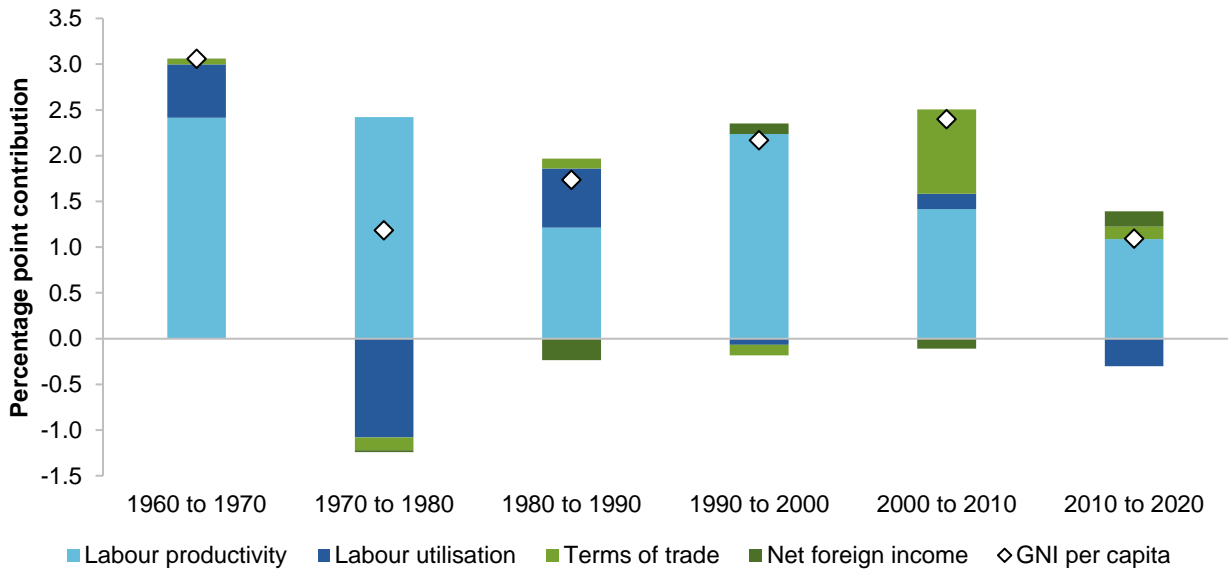
On the other hand, changes to labour force participation can influence productivity in either positive or negative ways. Productivity growth occurs when more output is generated per unit of input, and hence increasing the quantity of inputs is not necessarily a way to improve productivity. This is because, at some high level of labour participation, new entrants have on average fewer skills than people with strong footholds in the labour market. Some empirical evidence suggests that there is a trade-off between productivity growth and labour participation that is influenced by demographic and cohort effects (Boulhol and Turner 2009; McGuckin and van Ark 2005). On the other hand, if highly productive workers are not in the labour market or are working in a lower capacity than their skills and expertise would allow, then removing any barriers to their increased participation would contribute positively to productivity growth.

Labour scarcity, which arises when vacancy rates are high and persistent, also can promote productivity:

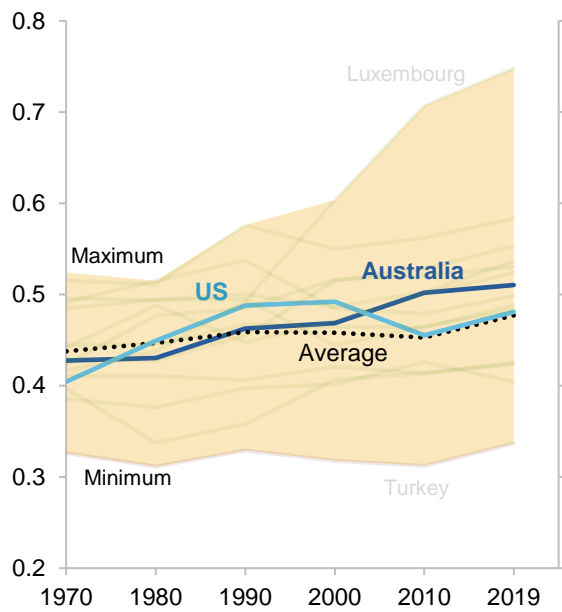
- Labour scarcity provides businesses with incentives to find more efficient ways to use their workforce, including by investing in productivity-enhancing capital.
- As businesses compete for better skilled workers in a tight labour market, this allows resources to flow to more productive areas of the economy, promoting overall productivity growth.

Figure 1.1 – Labour productivity and participation have each contributed to real growth in incomes

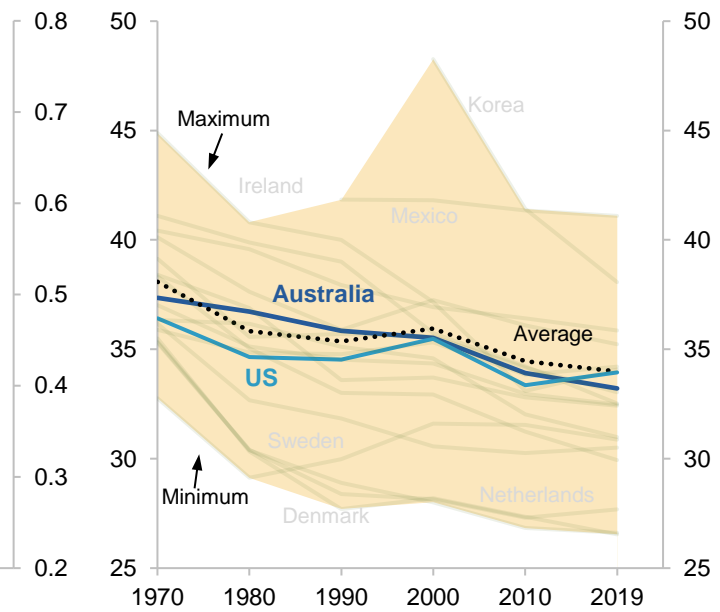
a. Labour productivity as a key driver of real growth in average national incomes



b. Employment to population ratio^a



c. Average weekly hours per worker^a



a. OECD membership has changed over time. To reflect this, the group of countries included in the 'OECD' calculations here changes based on the nearest decade at which the country ratified membership.

Source: PC (2022a).

In general, changes in the supply of labour can contribute to productivity through: **increasing the supply of valued skills** (or of employees with the needed characteristics); facilitating the **upgrading of the workforce**, including through training and education (discussed in volume 8); and/or **improving labour market matching** between the existing supply of employees with the firms' demands.¹

This would suggest that removing barriers or disincentives to labour supply can contribute to productivity growth if it leads to better jobs and skills matching by expanding the pool of available skills.

One example relates to differences between the number of hours a person *wants* to work and their *actual* hours worked. This type of mismatch can affect productivity, particularly if people face a trade-off between jobs that offer suitable (or flexible) hours and jobs that make better use of their skillset — for instance, if flexible hours were less available at senior positions.² Flexible working arrangements (such as working-from-home) can be used to reduce such mismatches. They may also be reduced in the longer term if the overall decline in average working hours were to continue. There is also scope for governments to adjust tax and welfare policies to provide additional incentives for people in certain circumstances to more closely align their actual hours of work with their preferred hours (box 1.1).

Similarly, immigration into Australia can promote productivity growth, particularly where it contributes to the supply of valued skills, and diffusion of knowledge from overseas. Migration settings themselves can improve labour market matching by influencing the composition of the migrant intake. Where migration does not increase the supply of valued skills or improve labour market matching, increased migrant workers may simply add to workforce participation rather than enhance productivity growth.

Labour mobility is also a key factor in labour market matching, and hence with growth in wages³ and productivity. Moving between jobs is beneficial where people and jobs are better matched. At the same time, labour mobility entails various costs for both employees and employers.⁴ While it is typically not possible to identify an optimal level of mobility, unnecessary barriers to labour mobility cause both employers and employees to forgo benefits.

¹ Adapted from the framework outlined by Criscuolo et al (2021a, p. 42) in their OECD Working Paper, described as a taxonomy of policy for 'spurring productivity growth'.

² Where increased participation does not improve the supply of skills or labour market matching, it is less likely to contribute to productivity, and hence less in the scope of this report (although may still contribute to other policy objectives).

³ Labour or job mobility allows workers to take up new jobs offering more attractive pay or conditions. In the presence of high labour mobility, wages may rise even for workers who do not move jobs — given the 'prospect of credible job offers' and its effect on workers' bargaining power. (Deutscher 2019)

⁴ Some workers may prefer job security. Switching to another job can incur adjustment costs as employees need time to adapt to new responsibilities and tasks, and may require employers to incur training costs, recruitment costs and the loss of institutional knowledge. In addition, where there is forced mobility, the benefits to workers and to productivity would depend on the existence of suitable alternatives — this may take time to realise and entail costs for those in frictional or structural unemployment.

Box 1.1 – The influence of the tax and welfare system on labour supply

Tax and welfare policies can have a direct bearing on incentives to work. Effective marginal tax rates (EMTRs) measure the loss resulting from income taxation combined with the withdrawal of transfer payments or income supplements that are associated with earning an extra dollar of income. High EMTRs present a strong disincentive to increase work hours.

A number of submissions to this inquiry have highlighted how the tax and welfare system can affect work decisions, particularly for parents who receive childcare subsidies and other means-tested income support payments, such as parenting payments or family tax benefit part A or B.

Availability of affordable, high-quality ECEC [early childhood education and care] services is fundamental to the ability of individuals with childcare responsibilities to work the maximum number of hours that they would like to work. It is central to Australia's ability to improve productivity. (KPMG, sub. 60, p. 17)

The cost of childcare combined with additional taxation and loss of family benefits means that for many women there is little or no financial benefit from increasing their paid work beyond three days a week. (Grattan, sub. 37, attachment 1, p. 34)

For some people, the choice to provide care to young children or other family members in lieu of paid work is a reflection of personal preference. For others, choices about care, workforce participation, and hours of paid work are influenced by the tax paid on additional hours worked and the rate of government assistance received (which can decline as household income rises).

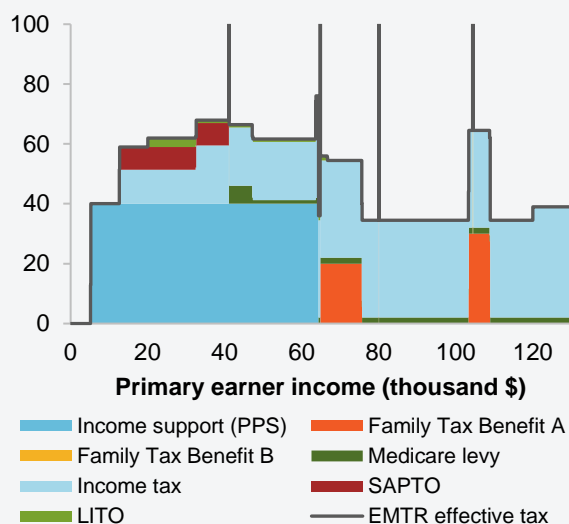
Reducing effective marginal tax rates is not straightforward. High EMTRs arise largely as a result of means-testing, which itself is a desirable characteristic of transfer policy design. In addition, any reform to EMTRs is complex, given that they vary with individual or household income and by family type.

The Productivity Commission has previously noted that the interaction of tax and welfare policies provide powerful disincentives for many second income earners to work more than part-time (PC 2014a). While early childhood education and care is just one of a broad range of work, family and financial factors that influence parent work decisions, it is one factor that is within the influence of government.

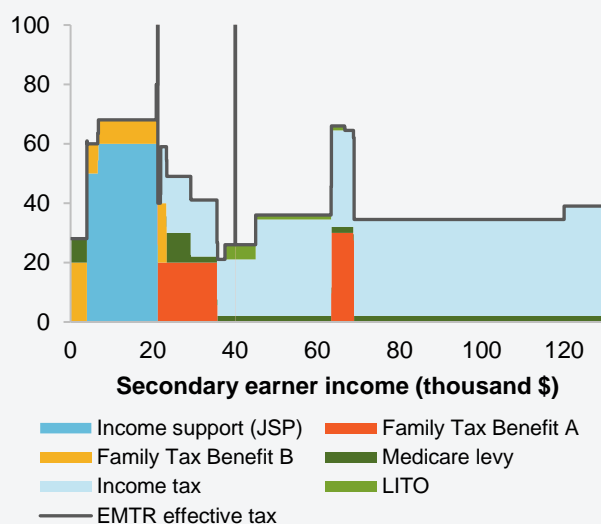
From a productivity perspective, benefits may accrue if the use of care services enables a better matching of parent skills to jobs, or if there are people with highly valued skills who are willing and enabled to increase their hours of workforce participation.

Effective marginal tax rates vary with household income structure

Sole parent with 1 child aged 6



Secondary earner in a couple with 1 child aged 6^a



a. Primary earner income fixed at \$40 000.

Source: Unpublished Treasury data.

Recent shocks to the availability of skills and labour

The COVID-19 pandemic severely disrupted global and intra-Australian migration patterns, with international and state and territory borders closed for prolonged periods of time. International borders remained closed even as Australia’s economic recovery began in earnest (figure 1.2). This led to relatively strong growth in both employment and job vacancies, as well as historically low levels of unemployment in mid-2022. Labour scarcity increased in sectors (such as hospitality) that typically rely heavily on migrant workers, but also bodes poorly for the availability of workers in some other sectors in the future — for example, in the context of rising demand for services such as aged care (CEDA 2021a, 2021b). While the efficient allocation of labour is always important, it has become even more so as unemployment has declined.

Globally, migration patterns have yet to return to pre-COVID norms (DAE 2022). For Australia, enrolment levels for international students have begun to rebound (figure 1.2, panels b and c) while temporary skilled migration is being used to a much lesser extent than in previous periods of low unemployment (such as during the mining boom) (CEDA 2022a).

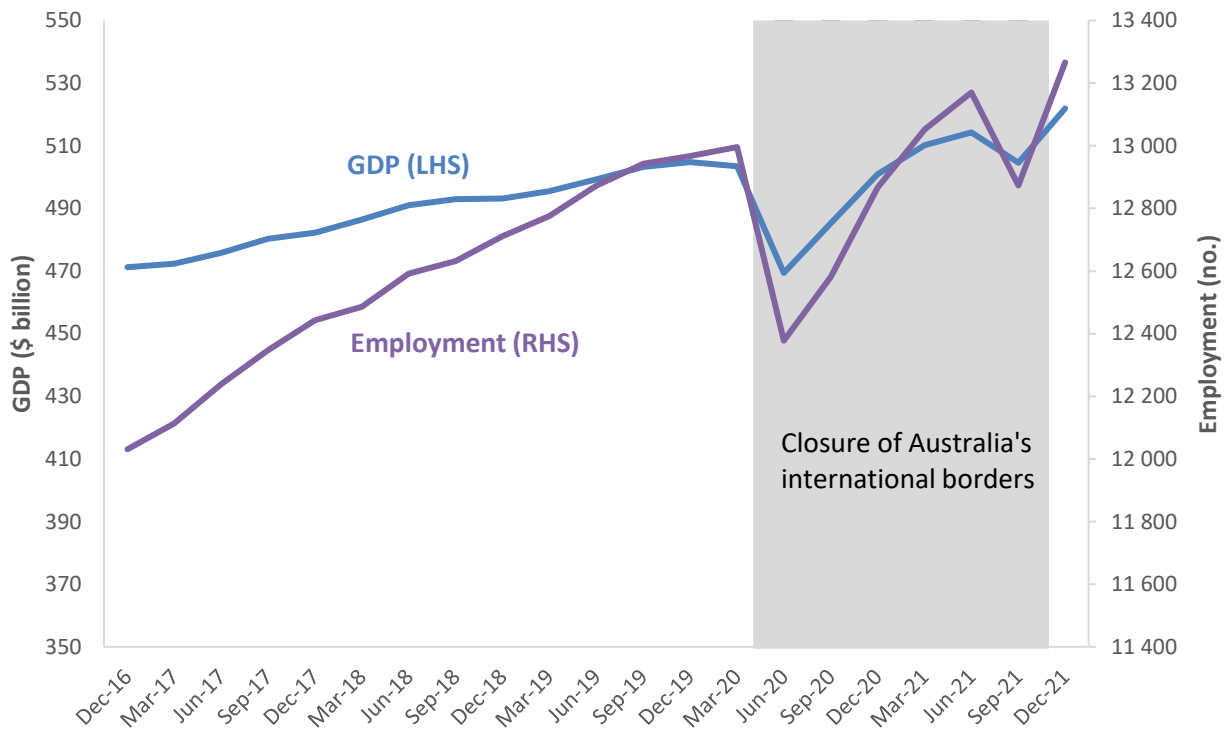
While migration is likely to recover, it is not guaranteed that Australia will retain its attractiveness to working migrants. Importantly for productivity, this could have significant implications for the *composition* of the migrant intake — Australia will need to compete to attract workers whose skills meet local demands, who are younger, and who bring valuable knowledge and innovations from overseas. Some indicative estimates of the potential productivity implications of migration are included in appendix A.

In addition, the health impacts of COVID-19 could have ongoing implications for labour supply and, potentially, to productivity growth over coming years. Extended periods of physical fatigue and cognitive disfunction are the most commonly reported symptoms of ‘long-COVID.’ Treasury estimates suggest about 31 000 people missed work due to long COVID each day in June 2022 (Moore 2022). However, in addition

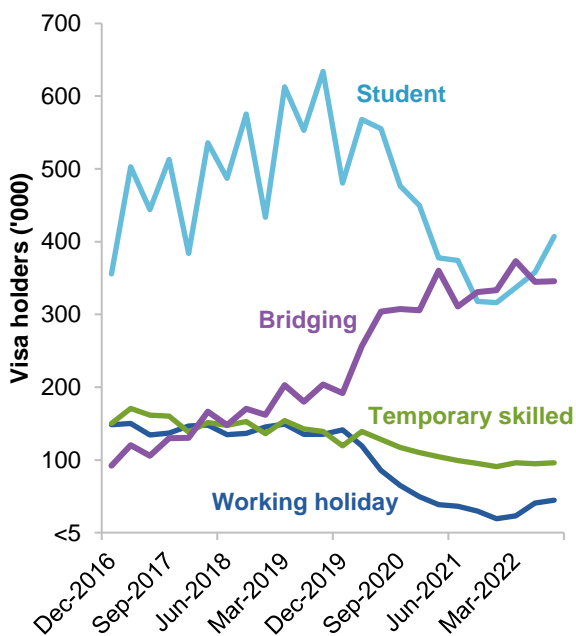
to absenteeism, it remains to be seen whether such symptoms will also result in people performing lower duties — making less use of their skills and capabilities.

Figure 1.2 – International borders remained closed as economic activity crashed and recovered

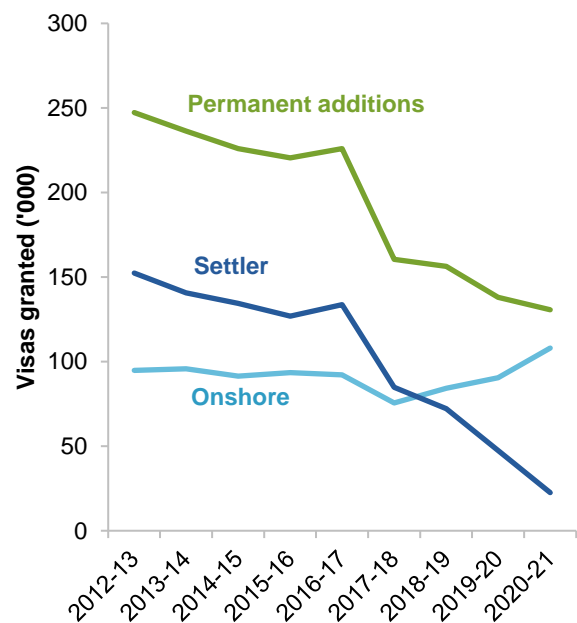
a. Economic activity and employment



b. Temporary migration



c. Permanent migration



Sources: ABS (2022b); DoHA (2021b, 2022c).

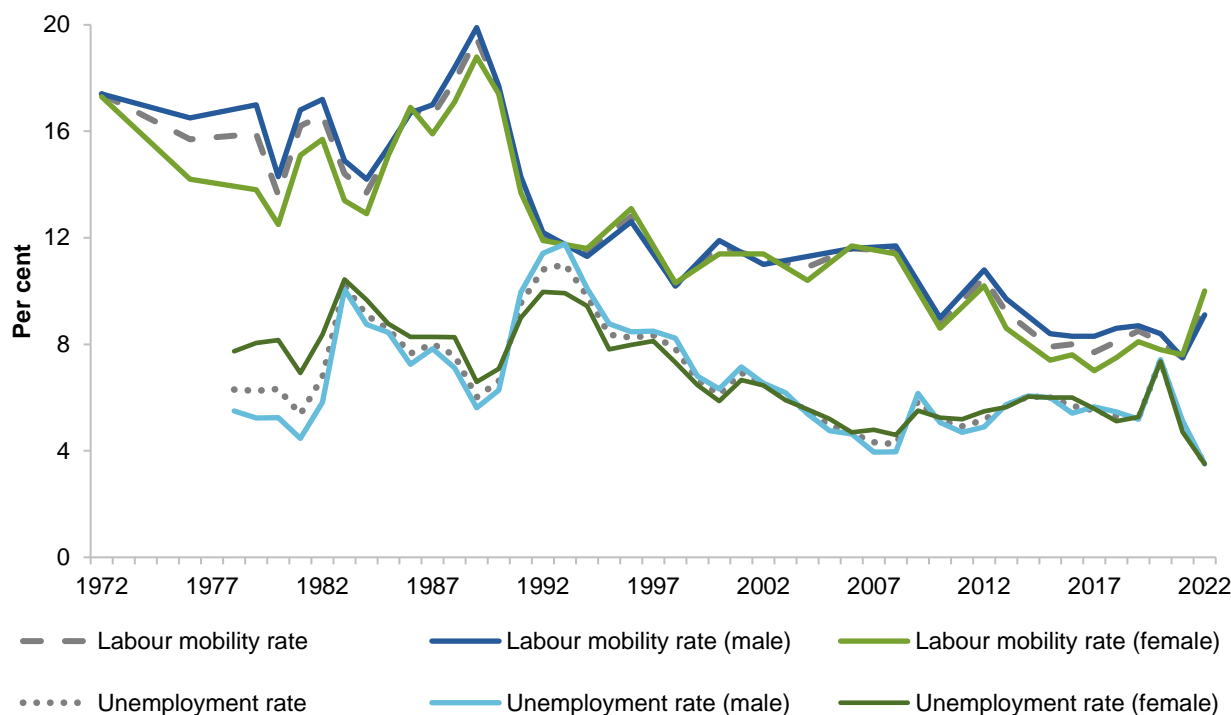
Declining labour mobility could inhibit better matching

Over the past 30 years, Australians have become less inclined to change employers (figure 1.3). Black and Chow (2022) note that ‘job mobility’ tends to change according to the business cycle (although recessions may also precede structural changes in the economy, with ongoing implications for the labour market). And while job mobility could intuitively be influenced by labour market conditions (such as the availability of alternative job options) both labour mobility and unemployment have experienced declining trends over the past 30 years. More recently, job mobility is likely to have been affected by the COVID-19 pandemic, both through disrupted economic activity as well as support programs that encouraged continued attachment between employers and furloughed employees.

However, job mobility is not only a function of economic circumstances — demographic factors are also influential. Job mobility for people aged 15–19 and 20–24 years was significantly lower following the GFC, and declined more significantly than for older age groups in the past 20 years (figure 1.4, panel a). Despite the decline, Black and Chow find that:

Typically, younger workers have higher rates of job switching than older workers. This is because young people have less firm- and industry-specific human capital than more experienced older workers and so have more to gain by changing jobs and increasing the quality of a job match; an example of this is a university graduate who switches from casual employment to a full-time career in an industry related to their studies.

Figure 1.3 – The relationship between job mobility and unemployment has varied^a
Share of employees who changed employers in the last twelve months; unemployment rate



a. Data collection is not uniform between 1980 and 2021 — as such, some points are interpolated. Labour mobility data was not available for 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011 and 2014.

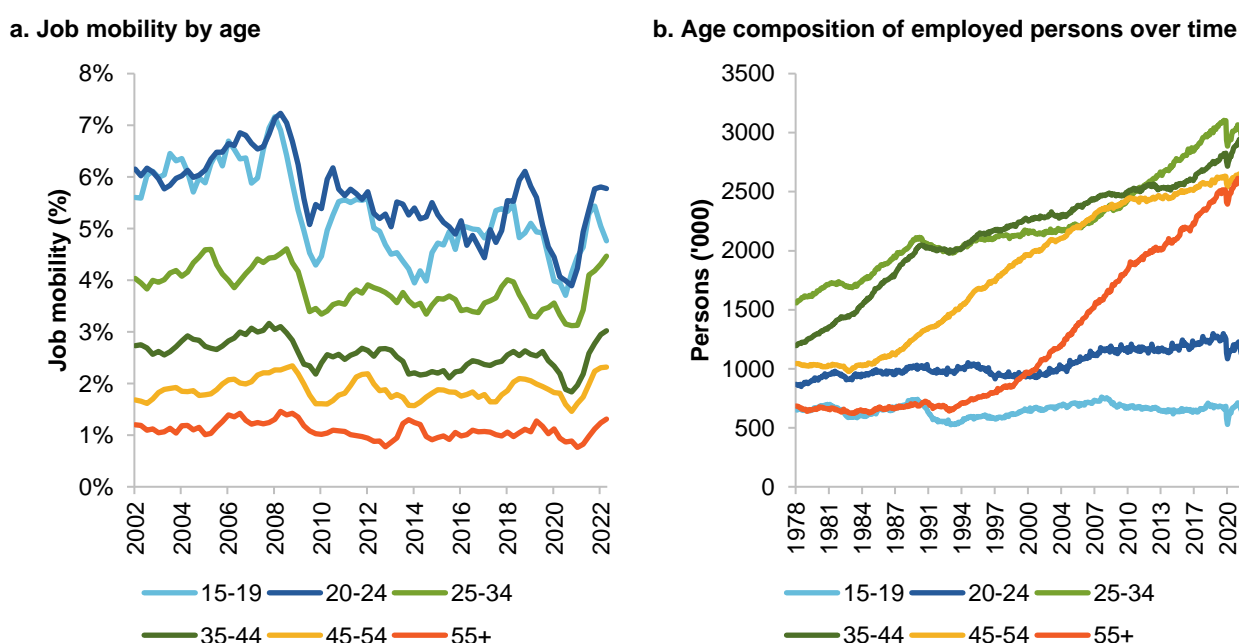
Source: ABS (2022c).

Job mobility has consistently been higher for people aged 15–24 years compared with older age groups (figure 1.4, panel a). However, younger people have comprised a declining proportion of the workforce over several decades (figure 1.4, panel b). This reflects population ageing, higher rates of tertiary education, and a significant increase in participation for those aged 45 years and older.

It is unclear how labour mobility will fare in the medium or long term. Structural factors such as population ageing suggest that the baseline level of labour mobility may be lower than in previous decades. Conversely, historically low levels of unemployment and high job vacancy rates may increase mobility in a ‘buyers’ market’. And the increased use of remote work will reduce geographic barriers to labour mobility for *some* occupations.

Some barriers to mobility may have worsened in recent years — for example, factors such as housing availability can weigh on geographic labour mobility, particularly the movement of workers into areas where job opportunities are expanding but where housing options are limited and expensive relative to incomes. As noted in the Productivity Commission’s (2014b, pp. 22–23) report on Geographic Labour Mobility, housing supply could be improved in part by removing or significantly reducing inefficient housing-related taxes such as stamp duties, as well as relaxing unnecessarily restrictive planning and zoning measures.

Figure 1.4 – Mobility partly reflects ageing of the workforce



Sources: ABS (2022b); ABS (2022d).

Trends in labour mobility will be determined in part by trends in competition and dynamism in product and service markets. As more firms enter a given product market, they provide new opportunities in the labour market. In addition, a greater degree of competition between firms allows more productive firms to gain market share and to expand their operations. As less productive firms exit, this should allow people to shift to where they are more valued and better utilised.

Regulation can also influence the allocation and utilisation of skills in the labour market. For instance, occupational licensing acts as a signal of proficiency and the quality of work output to employers and consumers, reducing information asymmetries. However, in some cases, occupational licensing is used inappropriately to limit entry into a market. For example, by requiring additional licences to perform the same

work in different geographic locations or to create boundary limitations on the tasks an otherwise proficient individual is able to complete.

These types of restrictions do not confer any public benefit and removing them would increase productivity through more efficient labour market allocation. This is particularly important when there are pre-existing constraints on labour supply that arise from a labour market in full employment. Some indicative modelling of the potential productivity implications of occupational licensing reform are included in appendix A.

The productive use of skills and labour

Workplace relations regulation has a bearing on both the use of efficient practices in the workplace and the allocation of more productive resources to more productive firms (where employers compete in the labour market). The different forms of wage setting will be relevant to different sections of the workforce. Each poses potential costs and benefits to productivity.

Across all employees, minimum standards are set via the National Employment Standards (NES) (legislated through the *Fair Work Act 2009* (Cth)) and the National Minimum Wage (centrally set by an independent body). They have a broad scope of coverage and provide limited room for flexibility for individual circumstances. While this level of centralisation is useful in prescribing a minimum standard, from a productivity perspective, it is important that other mechanisms exist alongside the NES to allow wages and conditions to meet more specific needs.

At the **industry and occupation level**, modern awards stipulate minimum conditions and wages that are customised for specific industries and sometimes occupations. Modern awards are designed to coexist with enterprise and individual bargaining, such that parties can negotiate on employment terms above the minimum standard. Unique to Australia, awards effectively establish hundreds of minimum wage levels — across the more than 100 awards and *within* awards across multiple classification levels (above the wage floor for the lowest paid). This method of centralised wage setting has several potential implications for productivity (chapter 4), not least because they form the benchmark for minimum conditions that must be met in any employment arrangement regulated under the *Fair Work Act 2009* (Cth).

Individual level bargaining allows employers and individual employees to negotiate wages and conditions above those set out in the NES, the relevant award, or applicable enterprise agreement. Individual bargaining improves productivity by allowing more productive workers to attract higher wages, providing incentives for workers to improve and demonstrate their efficiency. It also allows trade-offs to be made that suit the specific needs of the individual worker.

Collective bargaining at **the firm level** (for example, enterprise bargaining and greenfields agreements) allows firms and their employees to negotiate wages and conditions according to their specific circumstances. This provides a greater degree of flexibility than wage setting at the industry or sector level. Bargaining at this level is likely to improve the matching between firms and workers, as more productive firms can offer higher wages and better conditions to attract more productive workers. Moreover, it can be a source of innovation in determining new ways of working that benefit both employers and employees overall.

The **efficiency of each wage setting processes** also affects productivity, as bargaining processes require resources that can be used elsewhere. As such, firms face a trade-off between the level of flexibility they can achieve through bargaining and the time and resources required. Reliance on modern awards removes costs associated with the bargaining process, but allows less flexibility than bargaining and imposes other costs that reflect their content and the ongoing processes for their amendment. Some indicative estimates of the potential productivity implications of reforms to awards and enterprise bargaining are included in appendix A.

Challenges and opportunities posed by new forms of work

While platform work involves some challenges for workplace relations policy, it promises significant productivity and other efficiency benefits emanating from better matching between consumers, greater flexibility, higher quality on-demand services and gains in efficiency from more competition between firms. Although there are regulatory challenges associated with platform work, policy should not seek to shoehorn all platform workers as employees — which would risk reducing or removing key productivity benefits, including labour flexibility — but to address issues in a proportionate manner.

Some policy ambiguities include whether platform workers are (or should be categorised as) employees, uncertainties about the workplace responsibilities of platform owners for minimum pay and conditions or workers' health and safety, and lack of clarity about how disputes between parties could be effectively managed. There are also some misapprehensions about the functioning and outcomes of the gig labour market that have a bearing on appropriate regulation of this growing part of the labour market.

1.2 Where we have focused

This volume of the Productivity Inquiry focuses on key labour market issues with significant implications for productivity.

First, policy has a role in improving the supply of valued skills in the labour market, in part by ensuring the quality of skills, and in part by reducing the misallocation of resources that occurs as a result of avoidable rigidities.

- The quality of **education and training**, both from education providers and through on-the-job training, can improve the supply of needed skills (volume 8). Still, complementary policies can reduce underuse of existing skills.
- The **composition of the migration intake** is likely to be a significant policy issue for productivity. The design of both the migration system and occupational licensing requirements can act as barriers to allocating and attracting labour to where it is most productive (chapter 2).
- The use of **occupational licensing** in Australia has implications for the quality of skills in the labour market — through its role of setting minimum standards for training and experience, and its potential to restrict skilled labour supply if settings are excessively stringent (chapter 3).

Second, policy can improve the productive use of people's skills.

- Australia's **workplace relations** system will affect how work practices will evolve over time (chapter 4). Recent developments in **platform work** present both opportunities for novel flexible work practices and challenges for regulation (chapter 5).
- In the context of Australia's occupational licensing systems, both the **recognition of international qualifications** and **boundary issues in scope of practice** can have a significant bearing on the extent to which workers are able to fully use their skills (chapters 2 and 3).
- Other factors that are likely to influence job mobility include the extent of **competition and dynamism** in product and service markets (chapter 1, volume 3) and the **business environment for investment**, particularly as it relates to market entry (chapter 2, volume 3).

2. Improving productivity through migration

Key points

- ✳ **Australia's skilled migration program already provides a significant productivity dividend. However, further refinement of its settings would improve productivity**
 - Australia's visa program streams make varying contributions to labour market outcomes and productivity. In the past decade, the migrant intake has shifted toward visas that make relatively poor contributions. Given the importance of labour market matching, policy should target quality.
 - Skilled occupations lists are difficult to accurately construct and update, with doubtful value as a criterion for permanent migration.
 - Employer-sponsorship provides certainty of employment outcomes and should use high wage thresholds (and for permanent migration, age) as the key criterion for eligibility rather than skill shortages.
 - The points-based permanent migrant stream can attract migrants with particular skills and characteristics, but needs to be better matched to the needs of employers.
 - All investor visas should be abolished as they impose net costs on Australians.
- ✳ **Addressing poor labour matching**
 - Expanding default recognition of certain international licenses and aligning skilled migration requirements with domestic occupational license recognition requirements would allow migrants to work in the high-skilled jobs they were trained for.
- ✳ **The most significant fiscal risks of migration relate to permanent rather than temporary visas**
 - Temporary migration visas with longer and more certain durations would help workers and employers meet their needs without requiring permanent migration.
 - International students should have the expectation that they will be able to test their skills in the Australian labour market after graduation, but this need not involve permanent migration.
- ✳ **Creating a safety valve for shortages in government-funded care services**
 - Government fiscal pressures limit the capacity to raise wages to address the large and increasing shortages in caring occupations, particularly aged care.
 - To address shortages, a permanent migration scheme with a binding wage threshold should be piloted, but be wound back if an alternative funding model that can sustainably support higher wages is implemented.

There is significant scope to improve Australia’s migration settings to obtain large fiscal and productivity benefits for existing citizens.

- A starting point for considering migration policy is clarifying the relationship between migration and productivity in the context of other policy objectives (section 2.1).
- An assessment of the effectiveness of current policy settings suggests significant limitations in existing policy settings (section 2.2).
- Temporary and permanent migration visas can be improved through enhanced targeting and better pathways from temporary to permanent migration (sections 2.3–2.10).
- Some key barriers in the labour market specific to migrants can be reduced, including by recognising overseas qualifications (section 2.11). Addressing these issues would give policy makers a more accurate understanding of how to target the migrant intake.

2.1 Policy objectives and trade-offs

Key objectives for productivity and wellbeing

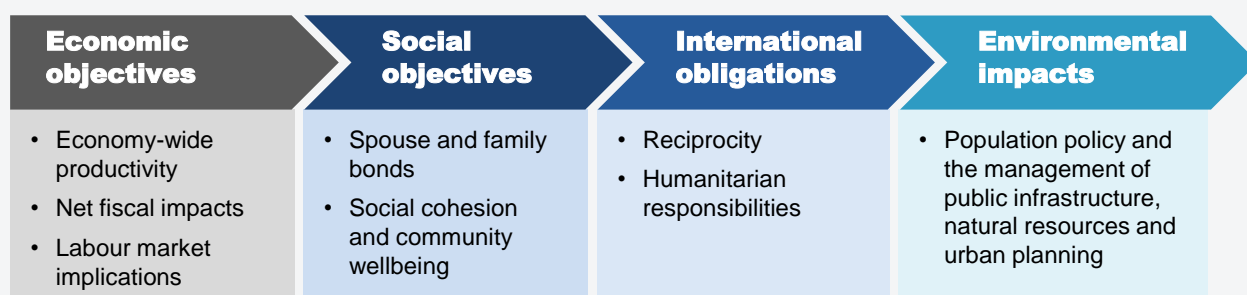
Several economic and social policy objectives should be considered in setting migration policy within a broader framework of public wellbeing (primarily for the benefit of domestic citizens, although their interests may coincide with those of migrants themselves) (box 2.1). Some benefits are intangible, including the contribution of migration to ‘Australia’s standing as a member of the global community’ (John Quiggin, sub. 102, p. 5).

Through a productivity lens, migration is an important avenue for attracting skills and knowledge, allocating labour to where it is most productive, and diffusing best practice from overseas. From a productivity lens, it is important that migration settings aim to improve the extent of matching of jobs and skills and produce fiscal benefits over migrants’ lifetimes. Both objectives are heavily influenced by the migrants’ labour market outcomes.

Box 2.1 – How migration serves public wellbeing

Migration affects several aspects of wellbeing

Migration affects public wellbeing across a number of fronts. From an economic perspective, migration affects the performance of the overall economy (such as more productive labour markets) and outcomes for individuals (workers, employers and consumers).



Box 2.1 – How migration serves public wellbeing

Whose wellbeing matters?

At a basic level, migration policy aims to improve the wellbeing of the incumbent citizens. However, the migrant's wellbeing is also relevant. Aside from being important in its own right, it is aligned with, and at times, forms part of the broader public benefit.

- Discrimination or exploitation against migrant workers entail broader costs relating to legal and social justice, concepts of fairness in workplace relations, the equitable nature of society, and the economic distortions in the labour market. Exploitation is not merely a matter of the migrant's wellbeing, but broader public wellbeing.
- There is a dynamic aspect to the impact of migrants. Long-run benefits can be greater than short-run ones, and any obstacles to successful transitions can forgo these. For instance, if a migrant's career is impeded during the early stages of their pathway to permanent migration, this reduces the benefits to Australia in subsequent periods. The labour market success of *permanent* migrants is in society's interest.

There are also potential trade-offs between the benefit of migrants and citizens.

- In the labour market, competition can lead to higher quality output, but can put downward pressure on wages. Broadly, this is more likely to benefit higher-skilled and higher-paid sections of the labour market, where individual productivity can be rewarded accordingly. If, however, migration significantly increases competition at the lower end of the income scale, and this exacerbates social exclusion of incumbent Australians, this could be considered a poor outcome of migration settings.
- In the context of Australia's tax and transfer system, everyone who participates in the economy (as a worker, consumer, employer or investor) has an impact on others. As such, all forms of migration has some form of fiscal impact, and the composition of the migrant intake will determine its overall fiscal implications.

Skills and job matching

One of the key productivity benefits of migration is that it contributes to the supply of highly valued skills, changing the composition of skills in the labour market and improving matching between skills and jobs.⁵

In the short term, the inflow of skills allows businesses to pursue commercial opportunities as they arise. In the medium term, businesses can adjust their investment plans and work practices based on the availability of skills in the labour market, which has been altered by different cohorts of migrants. In the longer term, the availability and movement of labour resources are key factors in shaping how Australian economy evolves.

Complementarity and shortages

The extent of labour market matching depends largely on complementarity of skills. Conceptually, Borjas (1999) argued that migration is productivity-enhancing when migrants' skills and capabilities are complementary to those of incumbents, leading to greater specialisation. This suggests that the implications for productivity depend principally on the composition of the migrant intake, the incumbent labour force, and the forms of capital in the economy.

⁵ To the extent that migration neither increases the supply of particularly valued skills nor improve labour market matching, then it is more likely to add to workforce participation rather than enhance productivity growth.

There then exist two sets of conflicting incentives. On the one hand, the [economic surplus related to immigration] is larger if the host country admits immigrants who most complement the skilled native workers, or unskilled immigrants. On the other hand, the economic surplus related to migration is larger if the host country admits immigrants who most complement the native-owned capital, or skilled immigrants. (Borjas 1999, p. 1707)

The effects of migration may also change over time, as the mix of skills and technologies change across the economy.

The empirical evidence highlights the differing effects of migration on higher and lower-skilled incumbent workers. For instance, in the United States, Peri (2012, p. 348) showed that the productivity gains from immigration were largely driven by task-specialisation of 'native' workers induced by migrants, in that:

... productivity gains may be associated with the efficient allocation of skills to tasks, as immigrants are allocated to manual-intensive jobs, pushing natives to perform communication-intensive tasks more efficiently.

At the same time, migration often targets labour shortages, thereby putting downward pressure on wage growth. Wages are an important mechanism in a well-functioning labour market — the adjustment of relative wages encourage workers to shift to jobs and industries where their skills are most valued. For these reasons, migration settings often hinge on attracting migrants where there are domestic skill shortages and incipient wage pressures that could limit economic growth. During the mining boom, for instance, migration was crucial in securing the skills needed to take advantage of commercial opportunities, while likely providing at least some downward pressure on the exponential growth in mining-related wages.

Migration can produce significant benefits in the absence of shortages, depending on the degree of skill and types of occupations involved.

- In skilled occupations, migration increases competition among professionals, which can provide incentives for workers to improve their skills or pursue further specialisation.
- Increasing the diversity of skills can lead to further differentiation of products and services. For example, while hairdressing could be considered a single occupation, hairdressers⁶ provide a diverse range of services requiring some specialisation. The barriers to entrepreneurship are relatively low, meaning that new practitioners are able to bring new service offerings to market. Accordingly, migrant hairdressers would be less likely to depress wages than would be the case with a more homogenous group in direct competition for a finite number of job vacancies.
- In some cases, migration can enable the diffusion of innovation, particularly where foreign work experience helps Australian firms adopt global best practices, or where foreign specialists may be necessary to implement technology or innovative approaches that are new to Australia.

One of the biggest concerns surrounding migration is the effects of low-skill migrants on low-skill incumbent workers. Those concerns partly reflect an assumption that incumbents' behaviour does not change to improve their prospects (such as engaging in training) and ignores the impact that additional labour has on additional demand. Moreover, workplace institutions mitigate outcomes for low-wage incumbents as they set floors in wages and conditions (Foged, Hasager and Yassenov 2022). The variations in such institutions between countries explains some of international variations in findings about the labour market effects of migration.

⁶ Similar arguments apply equally to other occupations such as cooks and chefs.

Australia's experience of job matching and migration

Empirical evidence suggests that, while migration may sometimes depress wages in some sub-markets (or limit wage growth), the size and frequency of any such effects should not be overstated. The overseas empirical evidence suggests that migration has a relatively small (negative or positive) effect on wages and employment of incumbent workers (PC 2016a, pp. 194–199). The evidence for Australia is generally neutral or positive:

- Broadly, Australian evidence suggests that immigration has not depressed wage growth for low-skilled workers (Brell and Dustmann 2019).
- Crown, Faggian and Corcoran (2020) examined HILDA data from 2005–2015 for different Greater Capital City Statistical Areas (GCCSA). They regress pay and other outcomes in each GCCSA against worker characteristics, state and industry-specific characteristics, and the number of temporary work visa holders as a proportion of the population. They found no evidence of negative effects of the temporary work visa holders on the wages of high-skilled or low-skilled native workers. Nor did they find negative effects on the wages of previous migrants, who may be closer substitutes to new skilled migrants.
- Breunig, Deutscher and To (2017) examined changes to migration supply in different skill groups (defined by education and experience). After controlling for experience and education, they found ‘almost no evidence that immigration harms the labour market outcomes’ of workers born in Australia. (The authors had been commissioned to undertake this analysis for inclusion in the Productivity Commission’s inquiry on the *Migrant Intake into Australia* (PC 2016a).)
- CEDA (2019) examined labour market outcomes of local workers, including the unemployment rate, weekly wages, and annual earnings. They analysed the effect of successive waves of migrants arriving in Australia since 1996. They found that waves of migration did not adversely impact labour market outcomes of local workers. A positive relationship was found between migration and wages.
- At the same time, evidence has shown that the risk of underpayment for many migrant workers is material in some industries (Cash 2015; Schneiders and Millar 2015; SEERC 2016). This risk extends beyond the design of skilled migration as it affects holders of other visas, including those with restricted and unrestricted working rights.

However, there is also evidence that systemic mismatches can occur between migrant skills and jobs in the labour market.

- CEDA (2021a) point to survey evidence suggesting that 55% of skilled migrants work in their nominated field while 15% work at the same or higher skill level than their nominated occupation. The remaining 30% work in jobs that involve lower skills than those in their nominated occupation or are unemployed — a significant sign of mismatch. For migrants arriving between 2013 and 2018, the degree of skills mismatch in their first 18 months of arrival resulted in forgone wages of \$1.25 billion.⁷
- Deloitte Access Economics (2018) found that in Queensland, about half of skilled migrants are not using the skills and experience gained before arriving, often due to lack of recognition of their qualification (25%) or of their work experience (14%). They estimate the cost of forgone wages and economic activity at \$250 million in the decade to 2019.
- Tan and Cebulla (2022) undertook econometric analysis of South Australian data to show that migrants faced a greater risk of unemployment than others (despite comparatively higher levels of qualifications) with about 52% of those employed identifying as overqualified for their job. They found that labour market outcomes for skilled migrants are affected by employers’ relative ‘devaluation’ of some foreign qualifications.

⁷ CEDA use survey data on the numbers of people experiencing skills mismatch, their skill level and median wages by skill level. Assuming a 12-month duration for skills mismatch, they estimate that skills mismatch is the equivalent of \$1.25 billion in forgone wages in 2018 for migrants arriving between 2013 and 2018.

- Engineers Australia surveyed 817 migrants with engineering qualifications and found that 57% of skilled visa holders were working as engineers, while a further 26% were actively seeking work as an engineer (Engineers Australia 2021, p. 19). They identify several issues including employers' preferences for local experience.

The existence of such labour mismatch suggests that policy settings should re-assess the composition of the migrant intake in terms of the type and level of skills, as well as their complementarity to the incumbent labour market (sections 2.3–2.10).

In addition, the economic effect of skilled migration is shaped by the barriers that migrants face once they arrive in Australia. Tan and Cebulla (2022) found that labour market outcomes for skilled migrants are affected by employers' relative 'devaluation' of some foreign qualifications. Engineers Australia note that new migrants face difficulty in meeting employers' preferences for local experience (Engineers Australia 2021, p. 19). To the extent that any such difficulties are avoidable, or indeed reflect unintended consequences of regulation, there could be potential for productivity-enhancing reform (discussed in section 2.4).

Lifetime fiscal impacts

The fiscal outcomes of migration can also improve productivity to the extent that they lower average taxes and the distortions these have on investment, innovation, labour supply and the returns from training. The fiscal impacts of migration and skills matching are separate but related concepts. All things equal, both can be improved when migrants achieve better outcomes in the labour market (for instance, skills mismatches result in forgone wages, which in turn have negative fiscal implications). There are also circumstances where the direction of their effects does not coincide (discussed below).

Overall, Australia's skilled migration program accounts for the vast majority of permanent migration and has substantially higher net fiscal impacts than incumbent Australians as estimated over the lifetime (table 2.1).

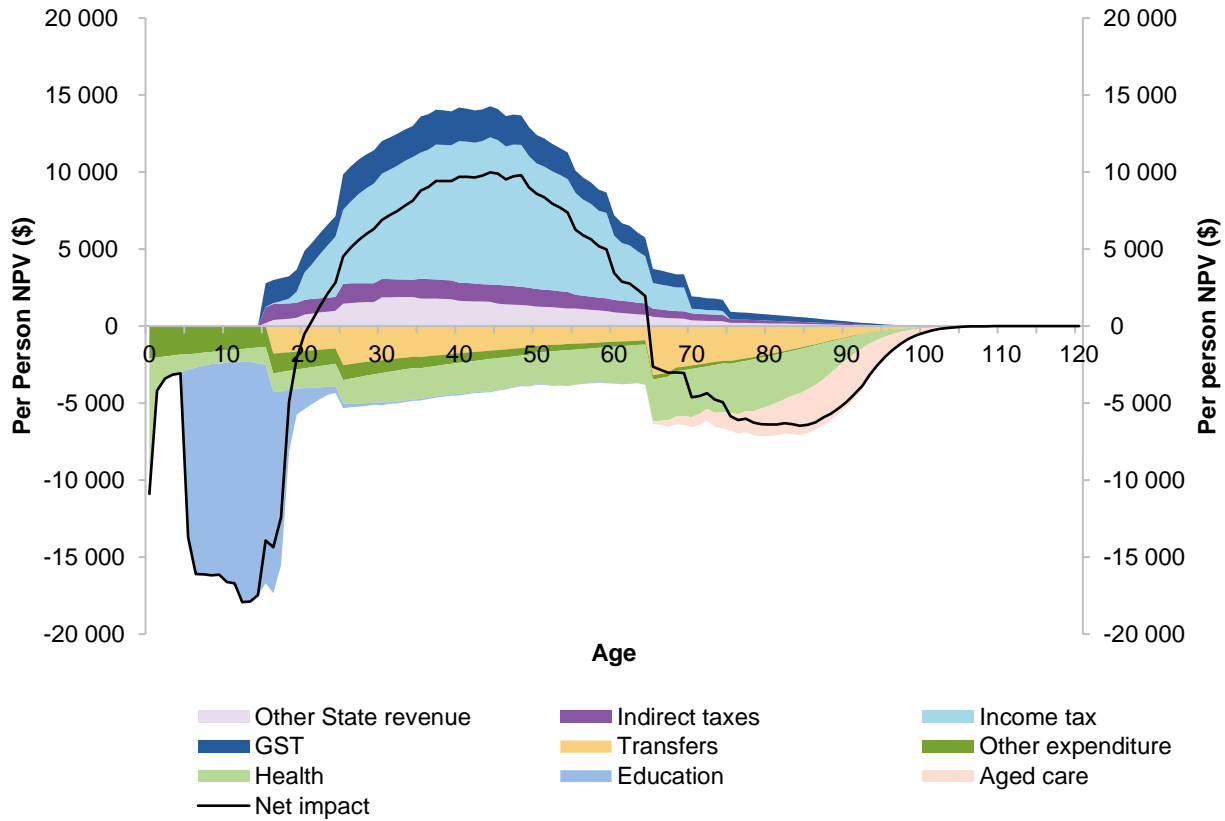
Table 2.1 – Lifetime fiscal impacts vary between permanent visa subclasses
Number of visa places for 2022-23 and estimated lifetime net fiscal impacts

Visa category	2022-23 planned number of migrants (No.)	Estimated lifetime net fiscal impact (NPV\$ per person)
Skilled migration	142 400	198 000
Total migration program	195 000	41 000
Australian population	–	-85 000

Sources: Department of Home Affairs (2022); Varela et al. (2021).

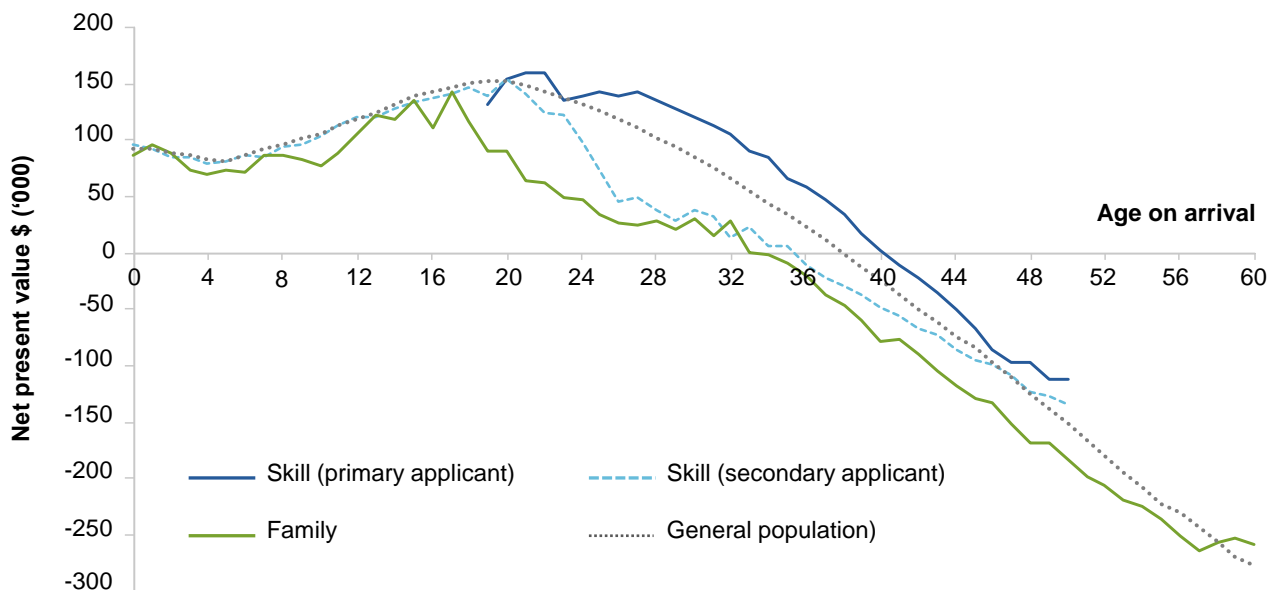
Most of the risk of negative fiscal impact occurs during childhood and after retirement (figure 2.1), so that the fiscal risk associated with migration relates mainly to permanent migration at older age groups. Migrants tend to have a net positive fiscal impact if they arrive as young adults because for much of their lifespan they work, contribute to taxes and use few (health and other) services (figure 2.2). Moreover, temporary migrants of working age are also likely to have net positive fiscal impacts as they are not associated with age groups with the greatest net fiscal liability and are not eligible for many free taxpayer-funded services.

Figure 2.1 – Typical interactions with the tax and transfer system
Estimated lifetime profile of fiscal revenues and expenses for an Australian born in 2018-19



Source: Varela et al. (2021).

Figure 2.2 – Key lifetime fiscal impacts by age on arrival
Net present value estimates of fiscal impacts per average permanent immigrant, net overseas migrant intake, 2013-14 dollars



Source: PC (2016b).

To improve fiscal impacts, permanent migration settings should aim to attract younger migrants. This requires the acknowledgement of migrants' fiscal contributions from the first year of their arrival (figure 2.1). This differs from the estimates of lifetime fiscal impacts for different visa subclasses produced by Varela et al. (2021) and PC (2016b) as there are many different pathways that conclude with the same permanent skilled visa. For instance, all things being equal, a migrant who had spent their early and mid-career in Australia on temporary visas only to subsequently take up permanent residency would have the same fiscal impact as if they had taken permanent residency immediately.

People who apply for skilled migration visas often have secondary and other applicants, typically spouses and dependent children, who have their own fiscal impacts. This suggests that improving the fiscal impacts of migration should take into account the entire migration 'unit', rather than the skilled worker alone. Such impacts should be considered alongside the non-economic objectives associated with visas for spouses and dependents given that it would be undesirable for migration settings to separate family members. At the same time, migration settings must balance the social benefits of such visas with the fiscal implications.

There can be trade-offs between the objectives of skill matching and fiscal outcomes. For example, a person with highly valued skills and high income migrating at an older age can still contribute significantly to productivity through their skills, networks and transfer of knowledge even if it is not for a long period, but nonetheless their subsequent retirement and use of services may produce net negative fiscal outcomes.

The treatment of secondary applicants in eligibility criteria also exemplifies the potential trade-off between fiscal impacts and job matching. For instance, a primary applicant with ideal labour market attributes might be:

- awarded a visa alongside secondary applicants who have negative net fiscal outcomes (thereby reducing the fiscal impact of the migration unit)
- or not awarded a visa due to the expected fiscal liability of their secondary applicants (thereby losing a skilled migrant who is highly valued in the labour market and would have otherwise been a prime candidate for the visa).

Key elements of design for the migration system

In pursuing policy settings that better promote productivity, it will also be important for policymakers to adhere to principles of good policy and system design. Some of the key design challenges for Australia's migration program are:

- to reduce complexity of the system overall
- ensuring integrity, including by protecting migrants from exploitation
- how to ration (permanent) visa places when oversubscribed
- addressing both short and long-term policy objectives.

While there are inherent trade-offs between different elements of system design, there are also opportunities for improvement.

Reducing complexity

Reducing the complexity of any administrative system is a worthy goal, given the implications for compliance and administrative costs. Australia's migration program has been described by many as being particularly complex (McIlroy and Read 2022; Universities Australia 2022), in part due to the number of visa subclasses,⁸

⁸ At the time of writing there were 22 skilled migration visa subclasses and 23 family and partner visa subclasses, among others for tourism, study, and humanitarian purposes.

and in part to the complex application processes and selection criteria. Many applicants for permanent migration engage migration agents to help navigate the system.⁹

To some extent, complexity arises because governments attempt to meet multiple policy objectives when shaping the composition of the migrant intake. Indeed, having very few visa subclasses to meet very many objectives would likely confuse policy decisions further.

There would be value in governments being explicit and transparent about what policy objectives and constraints drive migration policy. In particular, they should be clear about fiscal implications and the implications for productivity. This would not necessarily mean that economic constraints would override other objectives — rather, that social and other objectives should be met as efficiently way as practicable.

Designing efficient ways to achieve policy objectives will itself lead to some simplification of the visa system. And given that the economy-wide productivity and fiscal implications of migration far outweigh the compliance costs involved, the former should be given priority in driving reform.

Ensuring integrity

The integrity of the migration program is a perennial concern. For instance, given the risk that the Student visa could be used as a means of accessing paid work and not for study, restrictions are placed on working hours for Student visa holders.

Still, risks remain. Several incidents of underpayment have been uncovered for a range of visa holders, including those with restricted and unrestricted working rights (Cash 2015; Schneiders and Millar 2015; SEERC 2016). The enforcement of prevailing labour laws warrants continuous improvement. Moreover, any major reform to migration policy (including changes to institutional arrangements, incentives, or administrative processes) should involve an assessment of potential risks to integrity.

Managing oversubscription

Controls on the numbers of permanent migrants typically take the form of caps and eligibility criteria, with the cap the typical binding constraint in any given year if there is oversubscription. High levels of oversubscription is problematic as it increases the level of uncertainty faced by would-be immigrants, with potentially long-run impact on the attractiveness of a destination country. The backlogs that oversubscription raises introduce complications for governments. Permanent visas in Australia involve waiting periods of months (and sometimes years). Rolling backlogs make it more difficult to manage the migration intake over successive periods. A number of reforms could go some of the way to resolving these issues, including those discussed in section 2.10.

In contrast, temporary visas do not have caps, and inward flows are solely determined by eligibility criteria and the efficiency of visa processing.

Meeting immediate and future challenges

Migration policy needs to differentiate between and balance its short- and long-term objectives (box 2.2). If reforms were aimed only to meet the most immediate concerns, then in the current climate, it would likely target the labour shortages resulting from COVID-19-related disruptions. If aimed at longer-term challenges,

⁹ In 2018, there were 7402 migration agents registered with the Office of the Migration Agent Registration Authority (Joint Standing Committee on Migration 2019).

it would seek to address longer-term trends such as population ageing, and provide emerging skills and capabilities sought by more innovative firms.

Ideally, migration policy settings should provide some form of stability for prospective applicants, their families, employers, and communities. Pursuing long-term objectives requires some form of consistency of policy based on agreed principles but not the specific designs of all visa categories and the weight given to them. Some parameters will need to reflect contemporary conditions, *while at the same time*, addressing emerging trends and making provisions for longer-term needs.

Moreover, the overall migration program (and its system of visa subclasses) warrants regular review and revision.

Box 2.2 – Challenges for migration policy in the short and long term

In the immediate term, global migration patterns still reflect the aftermath of the COVID-19 pandemic, which disrupted both global and intra-Australian migration patterns, with international and state and territory borders closed for prolonged periods of time (chapter 1). In part, the effects of lower flows of migrants into Australia, especially by international students, was offset by the rise in bridging visas for temporary migrants already in Australia. Nevertheless, the net effect of changing migration patterns led to labour shortages in parts of the economy (such as hospitality and fruit picking) that typically rely heavily on migrant workers.

A broad question pertaining to permanent migration policy is to what extent Australia remains an attractive destination for skilled migrants — and how well can Australian businesses compete for talent in the global labour market.

The recent evidence is mixed on Australia's attractiveness compared with other advanced economies. Global interest in migration to Australia has shown signs of a strong recovery post border closures, and the Australian Government has recently announced plans to boost the migration cap. However, several other countries have taken proactive steps throughout the pandemic to attract migrants by increasing their permanent migrant intake and reforming visa policies (CEDA 2021a). If Australia has become less attractive to migrants than prior to COVID-19, future migration decisions may be more sensitive to the compliance costs associated with the migration system. Such costs affect all migrants, including those with skills that are highly sought after, who are likely to have labour market options elsewhere in the world.

In the longer term, migration settings will need to address evolving and partly unpredictable labour market needs. In particular, the demand for services will continue to rise, as will their variety. Population ageing will place increasing pressure on the demand for disability, aged care and health services while at the same time, dependency rates may deplete the workforce able to deliver such services (CEDA 2021b). Governments can partly address these looming pressures through policy planning (as led by agencies as Jobs and Skills Australia) and by setting an efficient workplace relations framework (such that wage mechanisms allocate labour resources to where they are needed). However, migration is likely to have an ongoing role in filling skill gaps, given that:

- various advanced technical skills are likely to meet excess demand due in part to the importance of emerging highly-specialised skills that might not yet be reflected in formal training (Boyton 2022)
- certain skills may become scarce where wage mechanisms are unable to shift workers' preferences (and constraints) about the kinds of careers they wish to pursue and where they wish to live.

Box 2.2 – Challenges for migration policy in the short and long term

The former will be particularly important for encouraging innovation and diffusion. For example, some emerging occupations, such as technology product managers,^a are difficult to find in Australia (discussed in volume 4).

The migration system will also need to better meet the needs of technology businesses that have a global outlook and need a global pool of footloose highly-trained employees who work closely with local staff. While this may replace some need for permanent migration, it will increase the value of fast processing of intermittent temporary migration for teams to collaborate.

a. These managers combine business, technical and user experience skills to oversee a product's development in a way that meets customers' needs.



Finding 7.1

Reform objectives for productivity-enhancing migration settings

Skilled migrants stimulate productivity and make net fiscal contributions over their lifetimes whereas under current fiscal settings, incumbent Australians make negative net contributions. Both productivity and public wellbeing objectives would be enhanced by migrants with skills that complement domestic labour and capital. Consequently, reforms should be designed to improve the composition of the migrant intake — to target migrants with valued skills of prime working age — and to address undue barriers in the labour market for newly arrived migrants.

Several key elements of system design are vital considerations in producing productivity-enhancing reforms.

- The complexity of the migration program increases compliance and administrative costs, but some costs are unavoidable due to the number of policy objectives associated with migration. Designing efficient ways to achieve policy objectives will itself lead to some simplification of the visa system.
- Backlogs for permanent migration are the result of different approaches to eligibility, and should be factored into reform decisions about the design of permanent migration visas. Waiting times for temporary visa approvals should be as short as practicable.
- Reforms to migration policy should be set with both short and long-term objectives in mind, and the overall migration program warrants regular review and revision.

2.2 Strengths and weaknesses of the current system

The policy objectives and trade-offs discussed in section 2.1 provide a basis for assessing the performance of current migration policy settings and to identify opportunities for improvement. From a productivity perspective, key considerations include the expected net fiscal impacts of different visa subclasses and their contribution to labour market matching. It is also important to consider whether particular visas achieve other intended objectives.

This section considers temporary and permanent migration visas, as well as the use of skilled occupation lists. The analysis is not intended as an audit of the performance of the Department of Home Affairs in administering the migration system. Some migration visas are not examined at all — such as the humanitarian stream — because they have different objectives.

Temporary skilled migration

The net fiscal impacts estimated for temporary migration visas are typically positive (table 2.2). Employer-sponsored migrants under the Temporary Skill Shortage (TSS) visa subclass have the highest net fiscal impact on average. While student visas have the smallest (though still positive) fiscal impacts, the primary objective of these visas is to facilitate study rather than paid work (indeed, paid work is deliberately limited as a condition of the visa).

Table 2.2 – Fiscal impacts also vary between temporary visa subclasses

Visa category	Estimated lifetime net fiscal impact per person (\$NPV)	Other details
Graduate (subclass 485)	7 806	Visa entails full-time working rights. Typical visa duration is between two to four years, depending on the qualification.
Student (subclass 500)	217	Visa entails limited working rights. Estimate does not include tuition fees paid to Australian education providers equal to \$32 000 on average.
TSS (subclass 482)	38 601	Visa entails full-time working rights and is dependent on employment (employer sponsorship). Typical visa duration is up to 4 years.
Working Holiday Maker (subclass 417 and 462)	2 317	Visa entails full-time working rights. Typical visa duration is one year.

Sources: Department of Home Affairs (2022); Varela et al. (2021).

Temporary skilled migration is under-used

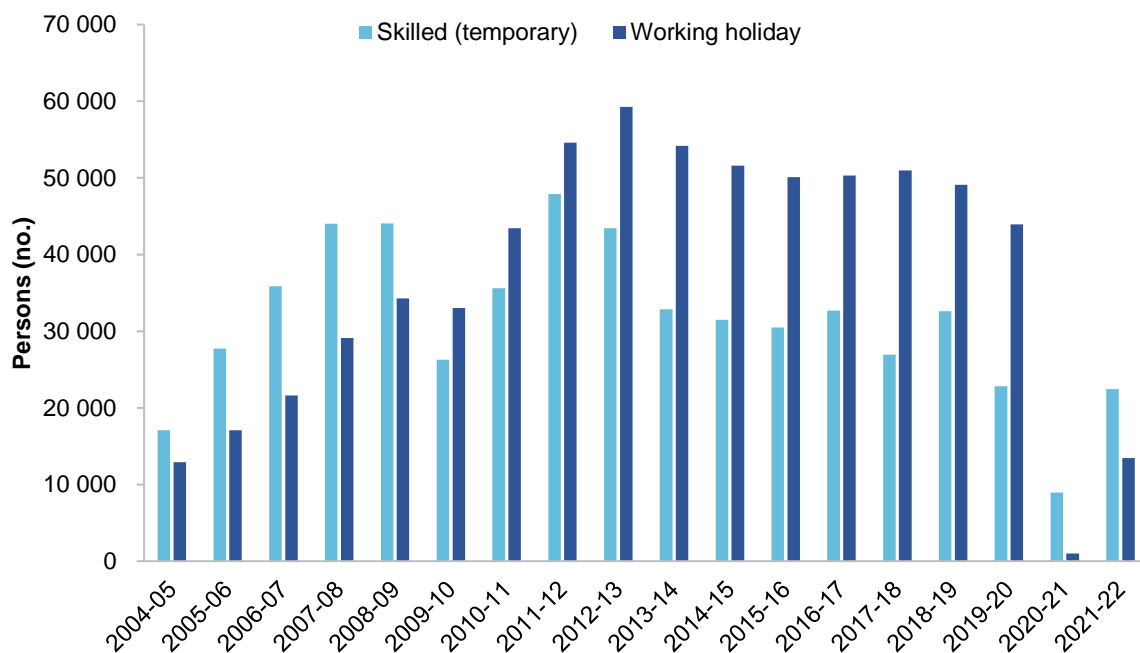
The use of temporary skilled migration declined over the decade leading up to the COVID-19 pandemic (figure 2.3), partly reflecting changes to the visa implemented by successive governments during the period. While numbers have shown signs of rebounding from the lows of 2020-21, they remain below pre-pandemic levels — despite historically low unemployment. Indeed, as CEDA (2022b) noted, temporary skilled migration was used to a much greater extent during the mining boom.

By contrast, working holiday visas consistently outnumbered skilled temporary visas over the past decade (figure 2.3). Overall, working holiday and student visa holders outnumber temporary skilled visa holders across all industries (figure 2.4). This suggests that much of Australia's temporary migration program is currently geared toward the supply of lower skilled labour.

In human services migrant workers typically hold working holiday, student and family visas. In Aged Care, 30% of workers are migrants, but less than 1% are sponsored for employment in this industry (Coates, Sherrell and Mackey 2022, p. 27). In caring professions more broadly, 38% arrived on a student visa (Eastman, Charlesworth and Hill nd). Relying upon 'sideways entrants' may not lead to optimal labour market matching, and prioritising skilled temporary visas for care work would likely produce better outcomes in terms of qualifications, experience and career motivation (CEDA 2022b).

Improving the administrative efficiency of the approval process would encourage greater uptake of temporary skilled migration. Waiting times are costly for employers seeking to temporarily fill skilled positions and limit the attractiveness of Australia as a destination for migrants.¹⁰ In January 2023, 50% of short-term TSS visas took 20 days or more to process, 10% took up to 3 months. Governments should weigh up the business and economic costs of delay against the administrative cost of increased resourcing, and give priority for temporary migrants that are critical to immediate business needs. Timely processing can also improve the value proposition of sponsored skilled temporary migration for employers. (It should be noted that the Department of Home Affairs has invested in additional staffing to decrease waiting times, and posts median waiting times to inform sponsoring businesses and migrants.)

Figure 2.3 – Temporary skilled migration is used less than during the mining boom^a



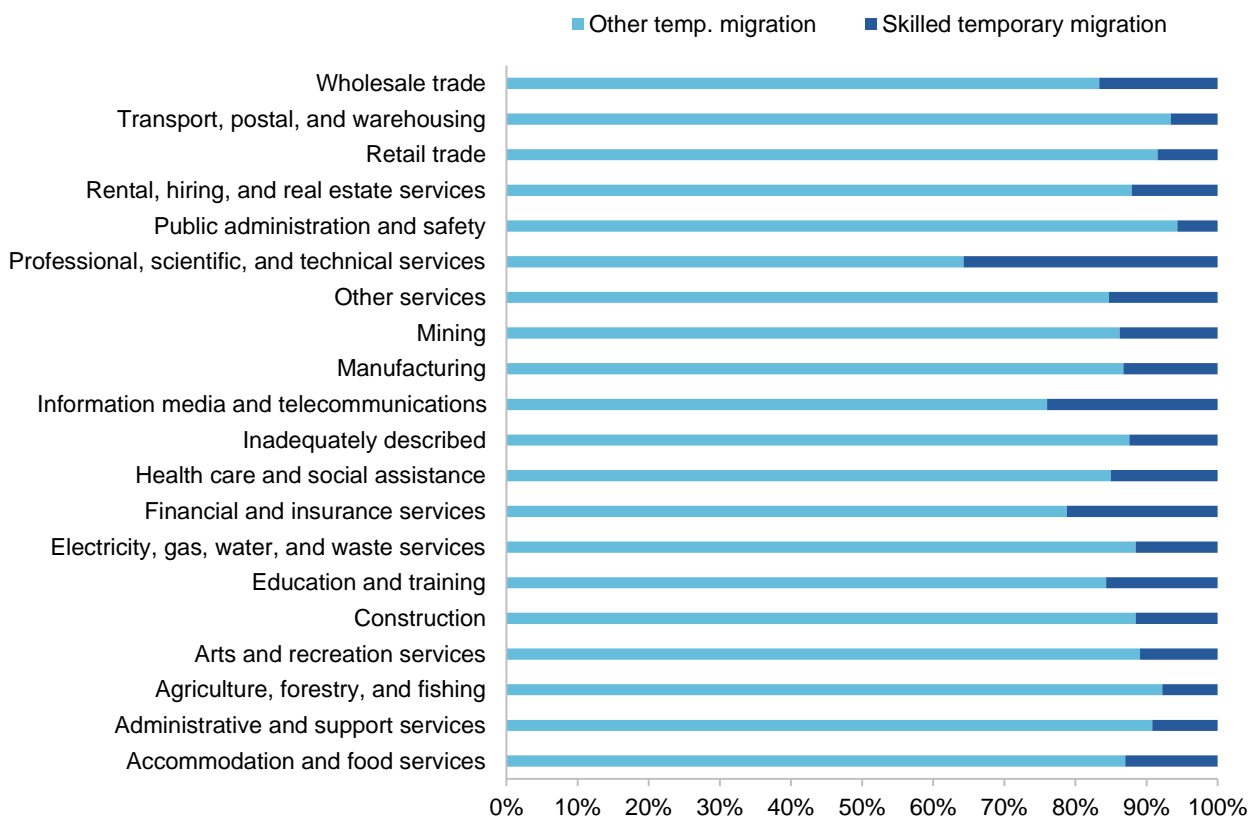
a. Estimates for 2021-22 are preliminary.

Source: ABS (*Overseas Migration*, 2021-22 financial year, Cat. no. 3407.0).

¹⁰ For TSS visas, about 90% of applications are resolved within 7 months for the short-term stream, and within 4 months for the medium-term stream (Home Affairs 2021c).

Figure 2.4 – Skilled temporary visa holders are outnumbered by other temporary visa holders in each industry

Proportion of temporary visa holders in each industry by type of visa, 2016



Source: Adapted from Coates et al. (2022).

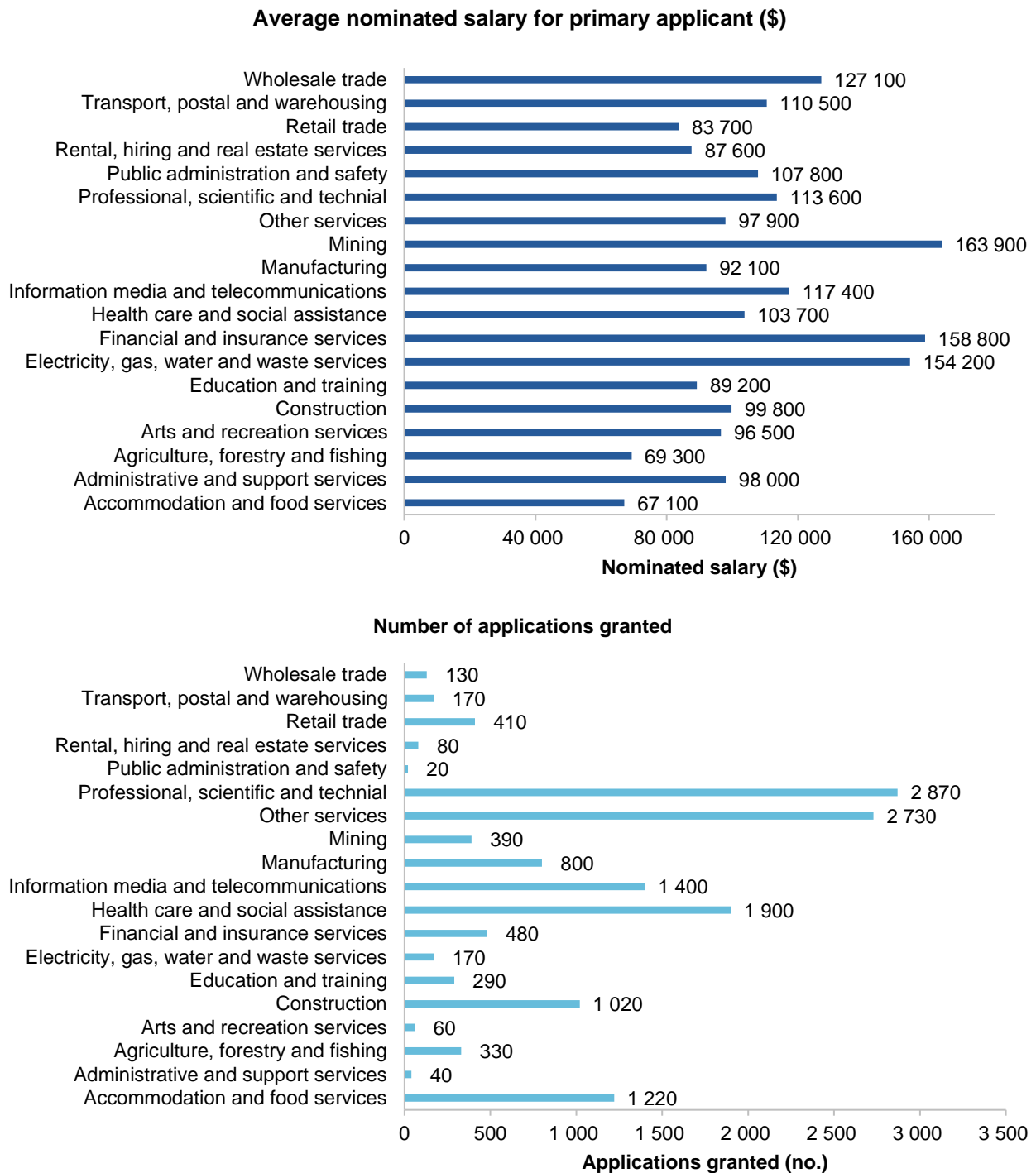
The re-design of the employer-sponsored temporary skilled migration, including how it is targeted, would have more fundamental effects. For instance, employer-sponsored temporary skilled migration is targeted, in part, by a salary threshold — The Temporary Skilled Migrant Income Threshold (TSMIT)¹¹ — that aims to prevent the use of sponsorship for low-wage occupations. However, while originally intended to reflect the median Australian income, the threshold has been held constant at \$53 900 since 1 July 2013 and would have risen to \$63 000 if indexed by the wage price index (Coates, Sherrell and Mackey 2022; Willox 2022).

Many sponsored workers are not affected by the TSMIT, even if it were indexed to the wage price index. On average, for visas granted in the September quarter of 2022, the nominated wage for temporary migrants across all industries is well in excess of this threshold (\$104 500), with the average for individual industries being in excess of \$80 000 except for in *Accommodation and Food Services* (\$67 100) and *Agriculture, Fishing and Forestry* (\$69 300) (Home Affairs 2022b, p. 6) (figure 2.5). However, at wage levels closer to the TSMIT (i.e. below median wages) employer-sponsored migration will include people with lower-level skills and experience — raising questions about the degree of complementarity to the existing workforce.

¹¹ In addition, employers must ensure that overseas workers are paid no less than an equivalent Australian worker.

Employer-sponsored temporary migration is also restricted to occupations in the relevant occupational skill shortage list. These lists significantly and adversely restrict the scope of (temporary *and* permanent) migration, which provides a strong motivation for their reconsideration (section 2.4)

Figure 2.5 – Average nominated salaries for temporary skilled migrants are relatively high in most industries, June to September 2022^a



^a For applications granted in 2022-23 as at 30 September 2022.

Source: Department of Home Affairs (2022b).

Permanent skilled migration

While it is difficult to directly estimate the extent of matching of jobs and skills among migrants, evidence from the Continuous Survey of Australian Migrants (CSAM) shows that after 18 months of settlement, 73% of skilled migrants were employed in either their nominated occupation (57%) or in a different occupation with an equivalent or higher level of skill (16%) (Department of Home Affairs 2020, p. 7). Among the 23% of all skilled migrants working at a lower level than their nominated field, this was more common in the state-sponsored scheme (31.5%) than for the onshore independent stream (26%), offshore independent (20%), or employer-sponsored (13%) (CEDA 2021a, p. 37).

Fiscal impacts are much more significant for permanent migration visas than for temporary — the longer durations entail greater opportunities to capture tax revenue over a migrant's working life, as well as greater risks of government expenditures later in life. The lifetime net fiscal impact of migration varies significantly between visa subclasses (table 2.3). Employer sponsored migrants have the highest net fiscal impact, while the Business Innovation & Investment visas are associated with the lowest (negative) fiscal impacts of the skilled migration streams.

From a fiscal perspective, the performance of the permanent migration program could be improved by adjusting the balance of visa subclasses in the migrant intake to favour the better-performing visa subclasses.¹² However, it is also important to consider how different visas contribute to labour market matching and whether they achieve other policy objectives. To the extent that it is clear why some visas perform better than others, this will help inform how reform could improve particular visa subclasses and/or whether the balance of the migrant intake should be changed.

Table 2.3 – Lifetime fiscal impacts vary between permanent visa subclasses
Number of visa places for 2022-23 and estimated lifetime net fiscal impacts of primary applicants for 2018-19

Visa category	2022-23 Planned number of migrants		Estimated lifetime net fiscal impact for 2018-19 cohort
	2021–22	2022–23	(primary applicants)
	No.	No.	(Net Present Value, \$)
Employer Nominated	22 000	35 000	557 000
Skilled Independent	6 500	32 100	386 000
Regional	11 200	34 000	279 000
State / Territory Sponsored	11 200	31 000	186 000
Business Innovation & Investment	13 500	5 000	-117 000
Global Talent (Independent)	15 000	5 000	–
Distinguished Talent	200	300	–
Total skilled	79 600	142 400	198 000
Australian population	–	–	-85 000

Sources: Department of Home Affairs (2022); Varela et al. (2021).

¹² This would require sufficient additional demand from applicants (and in some cases, sponsors) for different visa subclasses, and would also be subject to assumptions about the quality of additional applicants in each stream.

Business and investment visas

Business Innovation and Investment program (BIIP) visas are intended to attract foreign investment. However, these visas do not appear to have achieved this outcome or to have promoted innovation or genuine entrepreneurship (as discussed in chapter 2 of volume 3 and in PC (2016b)). In 2015, the Joint Standing Committee on Migration found that while the BIIP delivers some economic benefits, it failed on many grounds:

... based on the evidence, it is difficult to conclude that the programme meets any of the following key objectives:

- increase the export of Australian goods and services
- increase the production of goods and services in Australia
- introduce new or improved technology
- develop links with international markets
- increase the dispersal of business migrants across Australia through State and Territory government nomination. (Joint Standing Committee on Migration 2015, p. 30)

Moreover the mix of migrants using BIIP visas are inimical to productivity and fiscal outcomes. Compared with skilled worker visa holders, they have lower incomes, lower skills, poorer English language proficiency and are older. On average, the average business investment visa holder imposes a net fiscal cost of \$117 000 (Varela et al. 2021), which is well below that of other skilled migrants *and* of non-migrant Australians. Indeed, the estimated fiscal cost of the visa program could be greater, given that BIIP visa holders are more likely to be accompanied by secondary applicants.¹³

In 2021, the Australian Government (2021) announced a host of changes to the BIIP, which could improve its performance, but only at the margin.

- Age limits of 55 years were implemented, although they can be waived by the nominating party — the relevant State or Territory Government, or Austrade. The potential for State and Territory Governments to waive the age threshold disregards the fact that the majority of the fiscal risk at older ages is borne at the federal level (due to aged care and health services).
- English language requirements were implemented, albeit with the alternative option of paying a 2nd visa application charge, which may well be an entirely inadequate payment given future fiscal risks.
- Several investment thresholds were raised, including those relating to complying Investments, minimum net assets. However, these assets are owned by the visa holder and do not necessarily confer any benefit on Australians. As a highly open economy, Australia has far better ways of accessing foreign direct investment and in the volumes that make a difference.
- The minimum duration of investment was increased in some cases, including for provisional (temporary) visas, where investments now must be held for the duration of that visa. However, in several other cases, including for permanent migration visas, minimum durations were not changed.

It is unlikely that the recent (modest) changes to the BIIP will significantly improve outcomes. Overall, this set of visas performs poorly on almost all fronts.

¹³ Migrants under BIIP visas between 2012 and 2016 were on average accompanied by 2.4 secondary applicants, compared with an average of less than one for migrants under skilled-worker visa streams (Coates, Sherrell and Mackey 2021, p. 44).

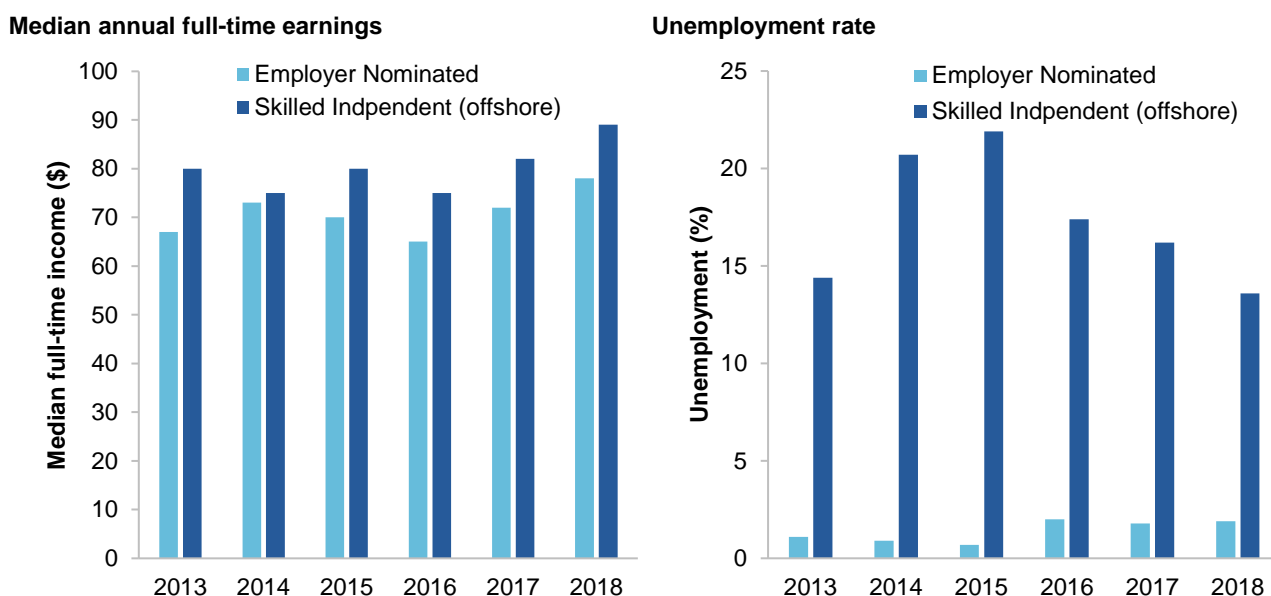
Sponsored and independent permanent visas

The bulk of the skilled permanent visa program is split between:

- the Employer Nominated visa (subclass 186), which requires an employer to formally nominate/sponsor an individual employee for permanent migration
- the Skilled Independent visa (subclass 189), which is based on a points system that rewards migrants' skills and attributes
- the Permanent Residence (Skilled Regional) visa (subclass 191), which also works on the basis of a points system but require a minimum duration of time spent in a nominated regional area
- the Skilled Nominated visa (subclass 190) which are allocated to State and Territory decision-making authorities allowing the application of additional criteria.

Employer-sponsored migrants have the highest net positive fiscal impact, followed by the skilled independent visa holders, though the latter have (slightly) higher wages when employed (figure 2.6).

Figure 2.6 – Skilled Independent visas have higher incomes and unemployment, 2013–2018



Source: Department of Home Affairs (2020) Continuous Survey of Australian Migrants (CSAM).

The fiscal results are counterintuitive given that the incentives faced by sponsoring employers only partly align with the public benefit, while the skill mix and incentives faced by skilled independent visa holders appear more likely to raise wages:

- While employers might expect to retain their sponsored worker for a significant period of time (say up to 5 or 10 years), they have no direct incentive to ensure the applicant has a successful career subsequently, nor any incentives related to the fiscal implications of the retirement phase. Accordingly, there is some potential for a disconnect between employer needs and net fiscal outcomes over the lifetime. There is a strong case that age restrictions should apply to any sponsored permanent migration visa, and potentially other attributes that are important for ongoing career success (such as English language skills).
- Similarly, employers have little to no incentive to consider the fiscal impacts of secondary applicants or the migration unit as a whole (although such impacts are not captured in the estimates in table 2.4).

- Employer sponsorship can also adversely affect labour mobility, at least temporarily, given migrant workers are unable to further test the labour market. This partly reflects the relatively high transaction costs borne by the sponsoring employers, which also leads to greater risk aversion about sponsorship (discussed later). These issues could partly be resolved by reducing the cost to employers of sponsorship, and by allowing workers to switch to similar or better job offers after a period of time with their sponsoring employer without applying for a new visa.
- Moreover, compared with employer-nominated visas, skilled independent visas entail no geographic restriction on the migrant (as is the case for regional and state and territory programs) and requires no negotiation or sense of implied obligation to an employer. A priori, it would appear to be the most desirable form of skilled visa from the migrant's perspective. Therefore, it would be reasonable to expect the most capable and valued workers to opt into the skilled independent visa.
- In addition, employer-sponsored migration has been used for a range of occupations, not necessarily higher-skilled or higher-income occupations, particularly prior to the pandemic (figure 2.7). Cooks were the most common occupation among Employer Nominated visas awarded between 2012-13 up to 2019-20, while a significant number worked as motor mechanics and restaurant and café managers — occupations where the prospects for complementarity with incumbent workers are relatively low. (Non-complementarity is usually associated with lower wages.)

The most likely reasons for better outcomes are that employer nomination identifies positive hard-to-observe traits of a migrant that are not readily measurable through the points-based skilled independent visa stream, and that its lower tangible and intangible costs encourage its uptake by talented migrants. Employers are uniquely situated to observe the skills and attributes required for the job, including soft skills that may not be demonstrated by formal credentials. This is difficult to replicate by other means and, consequently, points-based systems face an inherent challenge of targeting skills and attributes valued for a particular occupation — other than rewarding paid work experience itself, which is done imperfectly (discussed below).

Employer-sponsored visas are also attractive to those migrants wanting greater certainty about their career and wages given that skill mismatch is higher for independent visas. While independent visa holders tend to get higher wages when employed, they also have higher unemployment rates (figure 2.6). CEDA (2021a) noted that the Australian permanent visa subclasses that relied on the broadest occupation lists and lacked employer involvement had the highest rates of skills mismatch (p. 10).

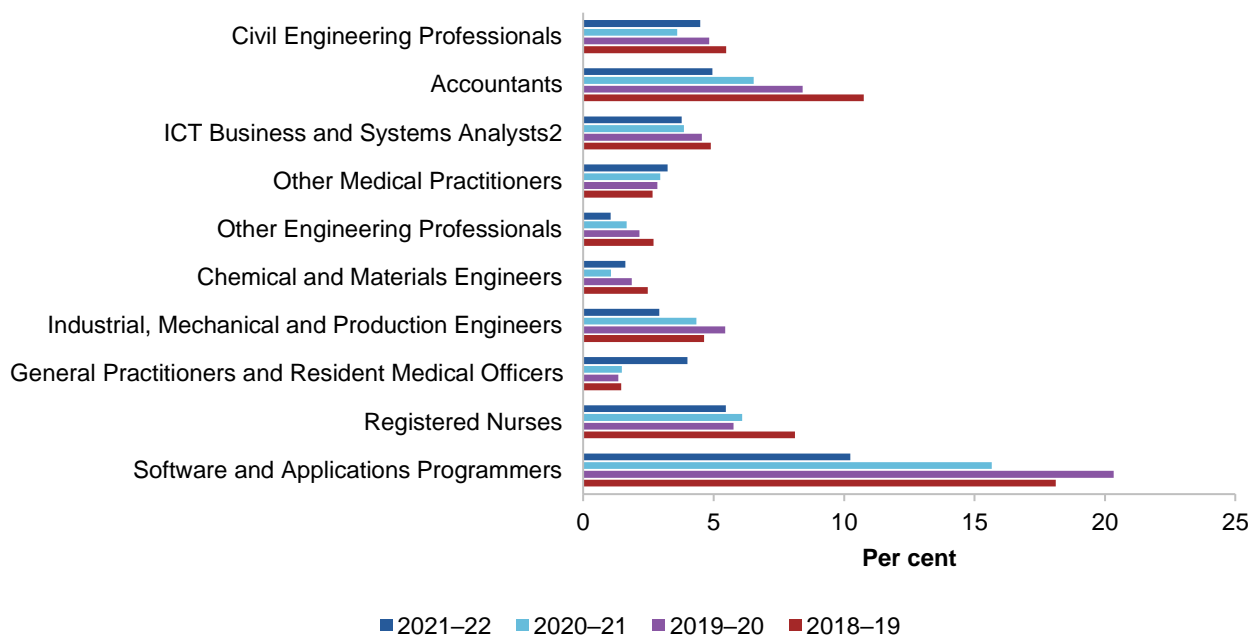
The pathway to permanent residency is also important given that about three quarters of Employer Nominated visas were awarded to applicants who had previously held a TSS visa (Coates, Sherrell and Mackey 2021). To the extent that the positive fiscal outcomes are a product of greater certainty about the applicant's ability to contribute in the workplace, this is likely to be greatly assisted by time spent on temporary skilled migration. In other words, a pathway to permanent residency that includes a period of temporary skilled migration may itself be valuable in identifying migrants with positive employment prospects (and this need not be unique to employer-sponsored permanent migration).

The (misplaced) intuition that the points-based skilled independent visa stream would necessarily be superior to the employer nominated stream is important in providing lessons for migration policy. Policy settings should, as much as possible, depend on evidence about outcomes and the underlying processes that lead to good employment and fiscal outcomes.

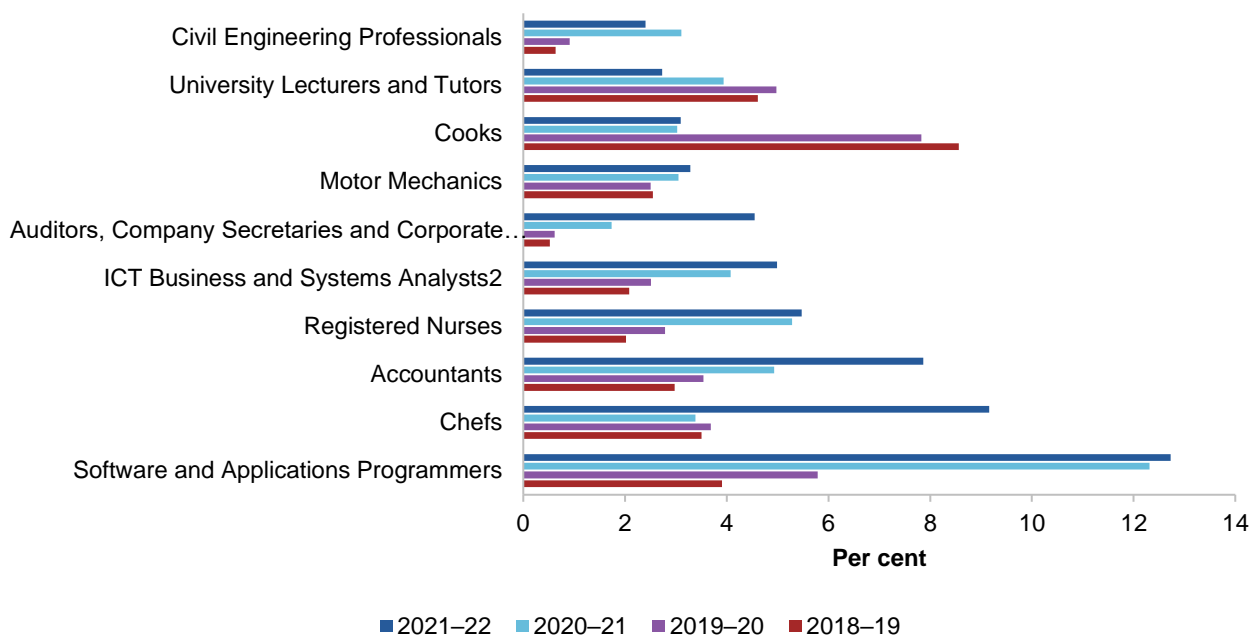
Figure 2.7 – Top 10 nominated occupations for permanent skilled visas before and after the pandemic

Primary applicants, 2018-19 to 2020-21

Skilled Independent visa



Employer Nominated visa



Source: Department of Home Affairs, Australian Migration Statistics, 2020-21.

Overall, the evidence suggests that **employer-sponsorship provides more certainty of labour market outcomes**, but **points systems can target valuable characteristics and higher-level skills**. There would be value in better targeting sponsorship towards higher-level skills and occupations, and accounting for the

fiscal risks related to age. The points-based system is more prone to labour market mismatch for some applicants, suggesting the selection mechanism could be better linked with the needs and preferences of employers in the labour market.

A key factor in the targeting of permanent skilled migration is its reliance on skilled occupation lists, which restrict skilled migration to occupations that are identified as being in shortage. Income thresholds may also be relevant in how Employer Nominated visas are used — similar to requirements for the TSS, employers must pay above the TSMIT threshold and ensure that overseas workers are paid no less than an equivalent Australian worker would.

Skilled occupation lists

Skilled occupation lists are used as a tool for rationing and allocation of sponsored temporary, sponsored permanent, and independent permanent migration, for both sponsored and independent visas (box 2.3). They are a key mechanism determining the types of imported skills. The performance of lists is relevant to productivity in that:

- they may result in undue restrictions on the use of migration to fulfill labour market needs
- preferential access to skilled migration for particular industries has implications for the efficient allocation of resources
- changes to the size and composition of migration have implications for labour market outcomes more broadly.

There are a range of conceptual and practical issues concerning the implementation of skills shortage lists.

Box 2.3 – Occupational lists for skilled migration in Australia

Eligibility for temporary and permanent skilled migration is determined by different lists, depending on the visa subclass. They include:

- The Short-term Skilled Occupation List (STSOL): lists occupations selected to fill ‘critical, short-term skills gaps’. This list has 216 occupations. A person who is qualified in an occupation listed on the STSOL can be sponsored for the short-term stream of the TSS visa.
- The Medium- and Long-term Strategic Skills List (MLTSSL): lists occupations ‘of high value to the Australian economy’ and aligned to the government’s longer-term training and workforce strategies. There are 216 occupations on this list. Occupations on this list can be sponsored for the medium-term stream of the TSS.
- The Regional Occupation List (ROL): includes 77 other occupations. Occupations on this list can be sponsored for the medium-term stream of the TSS. The Regional Sponsored Migration Scheme (RSMS) was also based on an occupation list before the program was closed in 2019.

Practical issues concerning skill shortages and occupational lists

Reliance on ‘skill shortages’ as a rationale for migration poses the risk that employers (either individually or at the industry-level) can claim shortages rather than adjusting wages. To this end, a recent parliamentary inquiry recommended the development of ‘accepted definitions of acute skill shortages’ taking into account a range of factors, including recruitment difficulty, the duration of the shortage, the number of job vacancies, and the critical nature of the occupation (Joint Standing Committee on Migration 2021, p. x).

Skills shortages are also subject to employer preferences. The Grattan Institute points to evidence that employers adjust their expectations of prospective hires depending on the state of the labour market.

When unemployment is high and workers are plentiful, employers are more selective about who they hire. When employer demand increases and unemployment is low, employers become more willing to hire people regardless of their education and experience. (Coates, Sherrell and Mackey 2022, p. 23)

This is not to say that the concept of skill shortages is without value, although much depends on their definition. Problematically, skill shortages are often defined as difficulties in hiring at *current levels* of remuneration (Boyton 2022). Instead, shortages should be identified where employers have difficulties in hiring even *after significant wage increases* rather than 'at current levels'.

The Productivity Commission has previously highlighted practical concerns about the accuracy of skill shortage lists as they are used in vocational education. Shortages have remained on the National Skills Needs List for several occupations for up to a decade, despite some occupations requiring traineeships taking one to two years to complete (PC 2021a, p. 329). This shows the importance of how lists are constructed and updated.

In addition, occupation lists can also entail significant compliance costs for both migrant workers and sponsoring employers. Eligibility is often governed by multiple lists, leading to administrative burden and regulatory misalignment (Coates, Sherrell and Mackey 2022; Joint Standing Committee on Migration 2021).

Staying up to date

Where lists are slow to update, they risk excluding new occupations that may be more relevant to firms on the frontier of innovation. Unless an occupation is categorised via ANZSCO,¹⁴ it is not possible for a shortage (or the occupation itself) to be identified (Joint Standing Committee on Migration 2021, p. 8). As described by VETASSESS:

... ANZSCO has only undergone minor revisions in 2009, 2013 and 2019 to address selected emerging occupations, specialisations and region-specific issues. That is, there has been little change over the course of two decades. (sub. 157, p. 3)

Indeed, it was only in late 2019 that the ABS provided advice regarding the ANZSCO classification of 'Data Scientist' for migration purposes (Coates, Sherrell and Mackey 2022, p. 24).

In addition, the current use of occupation lists can prevent migrant workers from taking up alternative jobs, including those that would make similar or better use of their skills. This is because their visa status is tied to a strict definition of their occupation.

If the occupation lists were abolished, workers would no longer be forced to work in one specific occupation. Currently, if an ICT customer service officer is offered a new job focused on market research, they would have to demonstrate their ability to perform the job and gain a new visa. (Coates, Sherrell and Mackey 2022, p. 50)

More broadly, occupation lists are likely to cater to industries where several (larger) employers are able to establish the need for migrant skills, but may restrict access from individual firms that hold unique, legitimate commercial needs. In this sense, they can make skilled migration less responsive to the needs of frontier firms. These effects are compounded when occupation lists are the basis for permanent migration as it favours more static occupations rather than new forms of work that demand similar skills.

¹⁴ The Australian and New Zealand Standard Classification of Occupations (ANZSCO) provides a basis for the standardised classification of occupation data for Australia and New Zealand.

A further practical issue relates to the need for — and lack of — timely data to identify skills shortages in real time. The Grattan Institute points out that:

Crucial parts of the skills shortage story — such as vacancy and wage data for occupation groups — are scant. Without this information, it is very difficult to generate reliable lists of occupations in shortage beyond simply accepting claims from employers. (Coates, Sherrell and Mackey 2022, p. 23)

In some cases, additional visa subclasses are required to capture highly valued occupations that are excluded by the applicable skilled occupation list. As discussed in volume 4, the Global Talent (Independent) visa (subclass 858) is used to target 10 specific sectors, including ‘DigiTech’, ‘Agri-food and AgTech’ and ‘Financial Services and FinTech’.¹⁵ In addition, several technology companies were accredited as sponsors under the Global Talent (Employer Sponsored) program, which allows sponsorship that is not restricted to occupation lists (Home Affairs 2021d).¹⁶

Overall, skilled occupations lists are not useful tools for migration policy. However, if refined to better capture conceptually sound measures of shortages, such lists can (and already do) have other valuable uses. For instance, well-researched and regularly updated lists can be used for planning and forward-looking policy formation.



Finding 7.2 **Opportunities to improve current migration settings**

Australia’s visa program streams vary significantly in their contribution to productivity. In some cases, the balance of the migrant intake has shifted in the past decade toward visas that make relatively poor contributions.

Greater usage of temporary skilled migration would improve productivity. One way to facilitate greater uptake would be to continually improve the administrative efficiency of the approval process. Another, more fundamental reform, would be to re-design the employer-sponsored temporary skilled visa, including how it is targeted and how well it meets the needs of employers and employees.

Both employer-sponsorship and points-based systems can play important roles in permanent migration. Employer-sponsorship provides more certainty of labour market outcomes, but there would be value in better targeting sponsorship in terms of skills, occupations, and age. A well-functioning points-based system can also play an important role in attracting migrants with valuable skills and characteristics, as long as the selection mechanism is sufficiently linked with the needs and preferences of employers.

Skilled occupation lists have major limitations when used as a criterion for permanent migration: they are conceptually ill-founded in their current form and difficult to accurately construct and update. Nonetheless, outside of migration policy, adapted forms of such lists may be useful for workforce planning more generally.

¹⁵ There are 15 000 visa places available under this program in 2021-22 and workers do not need to be employer sponsored (Home Affairs 2021e). Places in the Global Talent Independent visa category were awarded in the following priority sectors: DigiTech (34%); Health Industries (23%); Energy (17%); Financial Services and FinTech (12%); Resources (7%); Defence, Advanced Manufacturing and Space (6%); Agri-food and AgTech (0.9%); Infrastructure and Tourism (0.4%); Education (0.3%); Circular Economy (0.1%) (Home Affairs 2021a, p. 11).

¹⁶ As at end February 2022, these include Amazon, Culture Amp and Refinitiv (Home Affairs 2022a).

2.3 A better targeted migrant intake

A coordinated suite of reforms is needed to improve the composition of the migrant intake and to better promote productivity.

The balance of the permanent migration intake needs to shift away from skilled visas that contribute poorly to (or indeed detract from) productivity, wellbeing and other objectives.

The migration program should form stronger links with the needs and preferences of employers in the labour market by **better recognising ongoing employment and income levels**, as well as (but not necessarily) employer sponsorship. To the extent that policy settings can more directly reward labour market outcomes, this reduces the need to rely on characteristics and identifiers to predict labour market potential (like credentials). It can also provide a means of **avoiding reliance on skilled occupation lists**.

For permanent migration, selection criteria and other mechanisms used to determine eligibility should be calibrated in **recognition of age-related fiscal risks**. Because such risks do not apply to temporary migration, a better-designed temporary skilled migration visa could improve the value proposition of temporary migration (for instance, given the costs of relocation) without the fiscal risks of permanent migration. In particular, **sponsored temporary migration of sufficiently long duration** can meet the needs of migrants and employers alike (while remaining compatible with pathways to permanent residency).

Improving the pathways from temporary to permanent residency can reduce the risk of underemployment given the evidence that qualifications are a necessary but not sufficient condition for access to skilled occupations in the labour market. In particular, this involves shifting away from the presumption that qualifications will, in their own right, lead directly to permanent residency. Rather, obtaining an Australian qualification might reasonably be accompanied by a temporary visa that allows sufficient time to test the labour market and undertake some early-career work, which could then feed into eligibility for permanent migration.

In light of this suite of changes, pathways from temporary to permanent migration should acknowledge **the relevance of migrants' first arrival** in Australia as the time from which their contributions to productivity and fiscal outcomes begin. At the same time, the targeting of the migrant intake would be improved if steps were taken to **avoid creating backlogs where possible**, particularly if merit-based systems are designed to allow the top-most qualified applicants to be accepted each year.

2.4 Abolish business visas

As noted above, BIIP visas have made small contributions to their primary purpose of attracting new investment to Australia and have been associated with poorer (negative) fiscal outcomes compared with other skilled visas. In some cases, the BIIP outcomes reflect policy settings that could be improved (e.g. by amending conditions regarding the type, threshold, and duration of investment). However, the outcomes reflect a flawed initial concept — the types of investment targeted by the Significant Investor and Premium Investor Visas are unlikely to benefit greatly from a designated visa stream.

There may be a valid role for a visa stream that caters to entrepreneurs (as opposed to employees), but this can and should be captured as part of an improved points test for the Skilled Independent visa.

Given the small number of such visas, the costs of business visas account for a small fiscal liability in absolute terms. However, each permanent visa granted under the BIIP scheme also crowds out an alternative visa. If all 5000 of the BIIP visas slated for 2022-23 were replaced with a Skilled Independent or Employer Sponsored visa

(with no other changes to those programs) the fiscal difference over the lifetime would be \$2.5 to \$3.4 billion in net present value terms. There is no case for retaining this category of permanent visa.

Removing the visa also limits the fiscal impact of secondary applicants given that they are much more commonly associated with BIIP visas. This is a straightforward way to shift the balance away from poorer performing skilled visas to those with greater contributions to job matching and fiscal returns.



Recommendation 7.1 Abolishing investor visas

The Australian Government should abolish the Business Innovation & Investment visa program. Temporary migration should be facilitated for people with genuine plans to start a business in Australia, while pathways to permanent residency should involve the revised Skilled Independent visa, based on a points test that better accounts for income levels and age.

2.5 Replace skill lists

As discussed above, skill lists are permeated with deep flaws. These have been widely recognised by most stakeholders, though many advocate repair rather than removal.

- The Joint Standing Committee on Migration (2021, pp. 41–42) recommended that multiple lists could be combined in order to align pathways to permanent residence.
- CEDA (2019) recommended greater transparency in the data and methods used to devise the lists; reviewing the ANZSCO codes to better align them with technology and labour market trends; and changing governance arrangements (similar to the Migration Advisory Committee in the United Kingdom) to undertake analysis, consultation and advice on the formulation of skilled occupation lists.

However, the Productivity Commission doubts that sufficient repair is feasible for the purposes for which the lists are intended for the reasons highlighted earlier. The conceptual underpinning of list of occupations with shortages is weak, it is hard to see how a bureaucratic process could keep up with the many changes in occupations that emerge over time, and they fail to deal with the heterogeneity within any occupation, however finely tuned. Above all, giving more weight to employer-nominated migration with income thresholds takes advantage of the specific needs of businesses, and include facets that are missing from lists. These include specific experience, proficiency in given tasks within an occupation, the capacity to communicate and subtle factors like connections with peers, personal skills and motivation.

Moreover, to the extent that an occupation is relevant to labour market success, that role, if any, can be incorporated into an empirically-based points-based system (as described below).

The Productivity Commission agrees with the Grattan Institute (Coates, Sherrell and Mackey 2021, p. 62) that skills lists have little place in migration policy and should be removed.

2.6 Using income levels as benchmarks and thresholds

Implementing wage thresholds, higher than the current TSMIT would be a simpler and more effective way of identifying skills and occupations valued by employers than skill lists, an idea first proposed by the Grattan Institute (Coates, Sherrell and Mackey 2021, 2022; Coates, Wiltshire and Reysenbach 2022). Under this proposal, employers in any industry could fill vacancies via a sponsored temporary or permanent visa (subject to planning caps), so long as the relevant wage thresholds were exceeded. The proposal would strengthen the link between labour market needs and migration flows, and promote productivity and positive fiscal outcomes given the link between these.

Government can manage the risks from setting higher income thresholds by setting sensible thresholds and, introducing carve outs from the threshold in exceptional cases. Other visa categories provide an automatic mechanism for catering for the needs of some employees and communities without the need for new policy.

Determining thresholds

Views about the desirable level of thresholds — which are already in use for some visa categories — depend on the design of the overall migration system. The Grattan Institute suggested a threshold of \$70 000 for employer-sponsored temporary migration and of \$85 000 for employer-sponsored permanent migration (Coates and Reysenbach 2022; Coates, Wiltshire and Reysenbach 2022), which is consistent with dropping skills lists altogether. These are reasonable thresholds given it also supports abandoning skill lists, but acknowledges setting the exact number requires judgment. (As argued below, the Productivity Commission also recommends that the permanent visa threshold should rise above \$85 000 once a certain age limit is reached).

Thresholds around the levels specified above are high enough to make skill lists redundant and to avoid concerns about displacing lower-wage incumbent workers, and low enough not to eliminate migration of many valued skilled workers. The two-tier nature of the thresholds takes account of fiscal considerations. Permanent migrants have rights to Australian social security and taxpayer-funded human services, so that these costs need to be offset by the returns they provide to the economy when they are working. There are no equivalent problems for temporary migrants, who must insure against the costs of government services.

All thresholds have boundary problems. There *will* be valuable migrants who fall just below the relevant thresholds, but this will always hold, including for the current TSMIT. Notably, wages for higher skill levels, occupations and industries are often above even relatively high thresholds (figure 2.8 and figure 2.9). In any case, thresholds should not be set rigidly. They will need to maintain some degree of relativity with movements in average wages over time or they will no longer have their intended effect, and if they are too high or too low, periodic reviews should alter their levels.

There are alternative thresholds to the Productivity Commission's (and the Grattan Institute's proposal), but none look superior. The Australian Industry Group (2022) and Australian Chamber of Commerce and Industry (2023) cautioned against large increases to the income thresholds, but this would work against eliminating skill lists. The ACTU had suggested the TSMIT be set in line with Average Weekly Earnings (equivalent to \$90 917 at the time of this report) (ACTU 2022a, p. 16)¹⁷ but would excessively undermine the role of the migration system in attracting skilled workers. An alternative approach would be a hybrid of the current migration system that maintained skill lists for some wage thresholds and removed them above a high level. For example, the Business Council of Australia suggested that above a threshold of \$92 000,

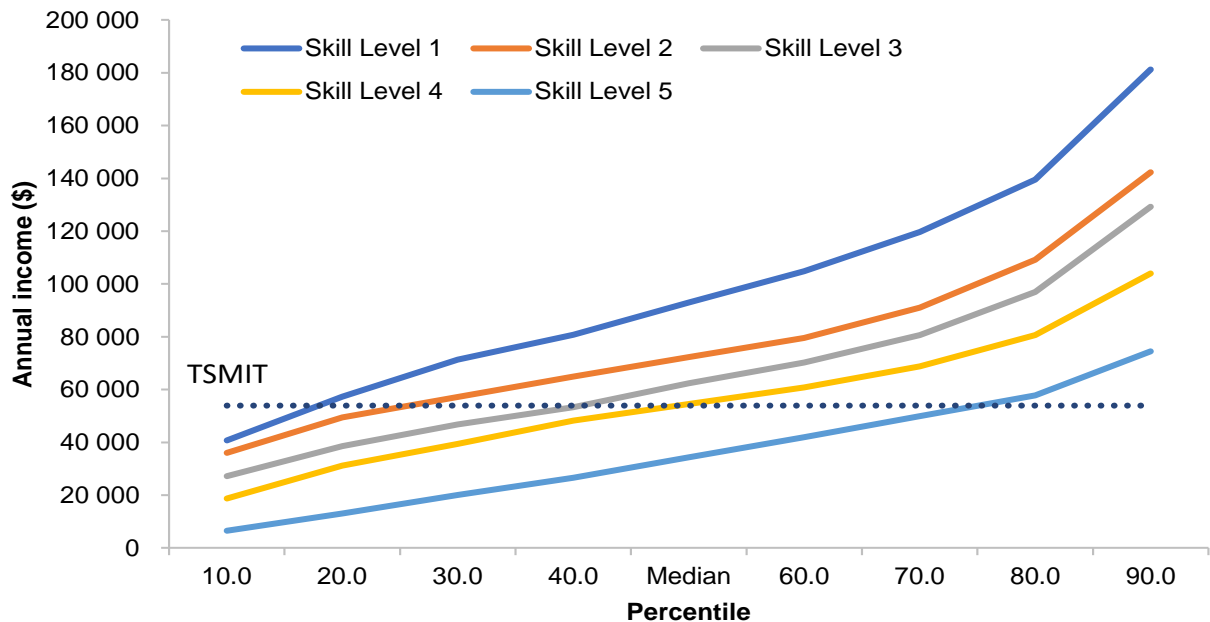
¹⁷ In 2018, the ACTU also suggested that consideration should be given to setting the TSMIT at level equivalent to Average Weekly Earnings, and that as a more immediate measure, the TSMIT be raised to \$60 000 in order to make up for a lack of indexation.

employer-sponsored migration could occur without restriction from a skilled occupations list; while for jobs paying between \$92 000 and a lower bound (to be determined by government) employer-sponsored migration could occur with the use of an improved occupations list (where the lower bound should be no more than \$65 000) (BCA 2022, pp. 14–16). This is an imaginative option, but is still subject to the flaws of skill lists (albeit reducing their risks). CEDA recommended creating a stream for high-wage, low-risk migration above a threshold of \$120 000, while also raising the TSMIT for temporary migration to \$66 000 (Ball 2022, p. 13).

While differentiating thresholds between temporary and permanent visas has a strong foundation, the question remains whether there are any other dimensions along which thresholds should vary.

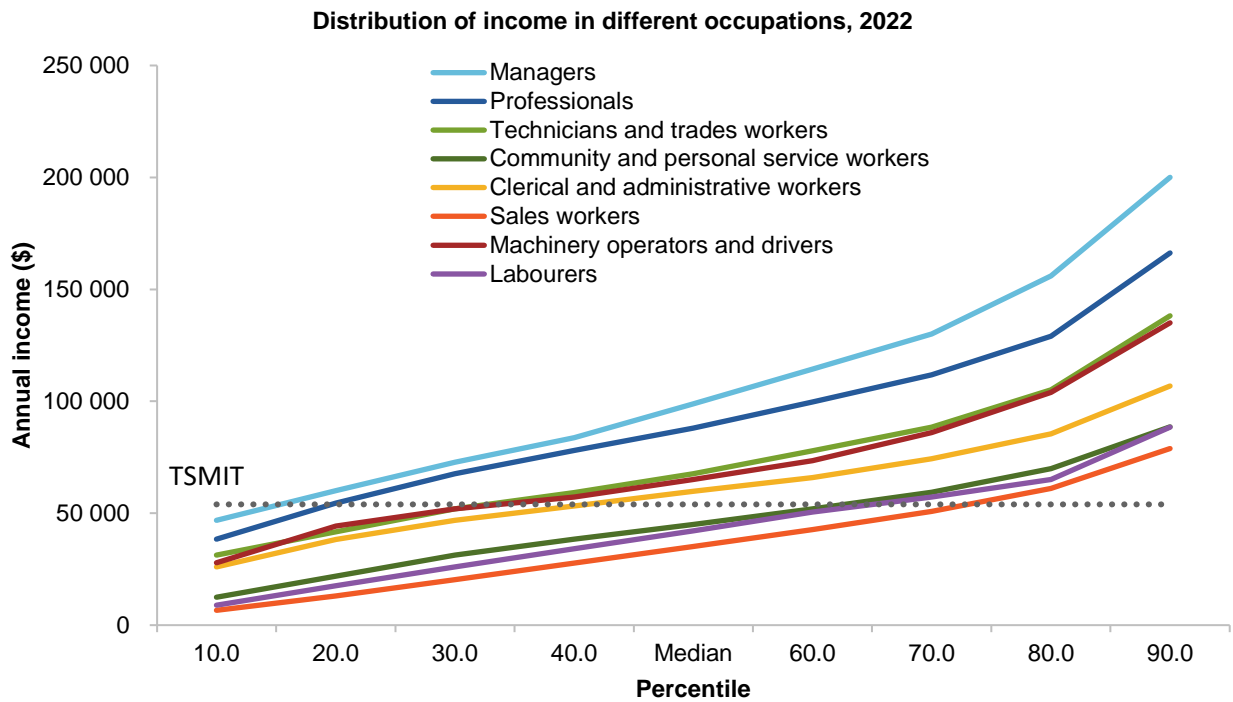
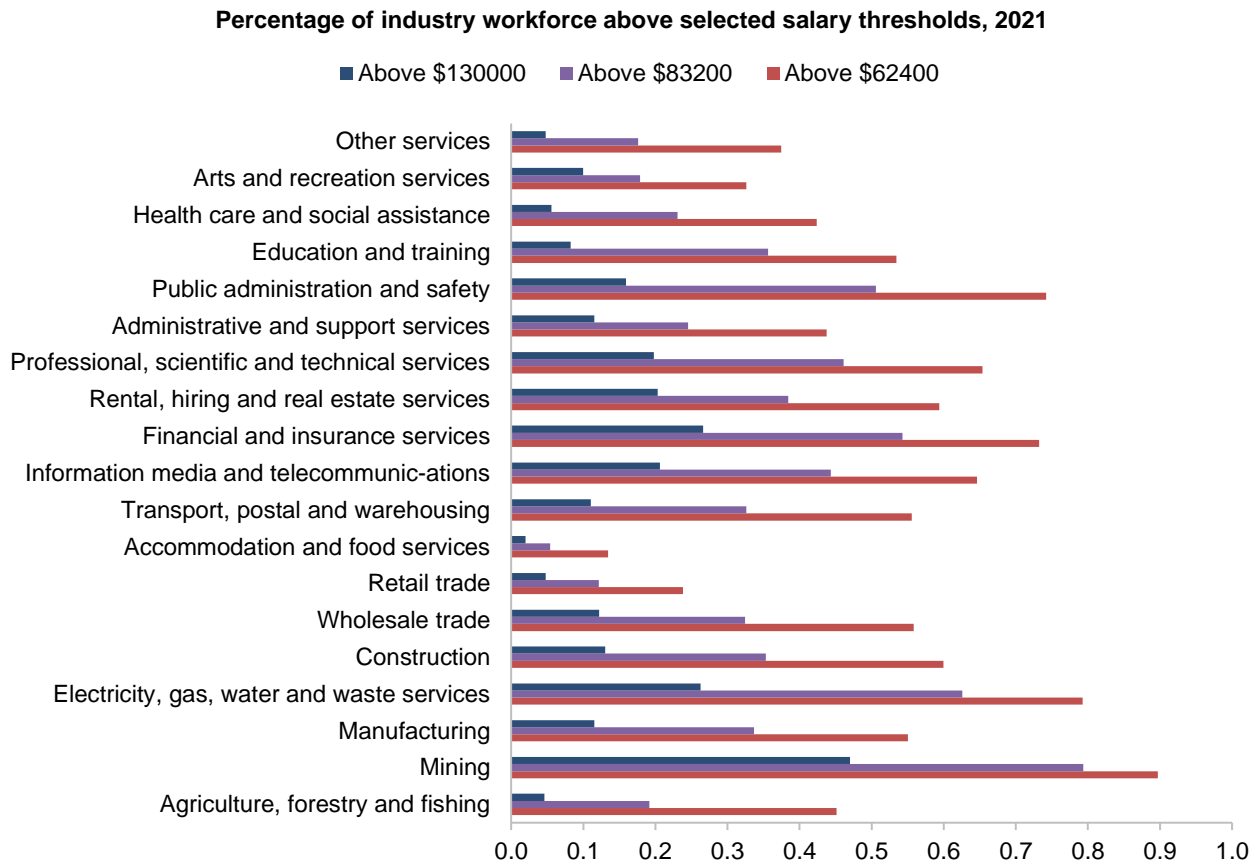
Figure 2.8 – Distribution of salaries compared with TSMIT

Annual income for all employees by skill level, 2022



Source: ABS (*Employee Earnings*, August 2022, Cat. no. 6337.0).

Figure 2.9 – Distribution of salaries by income and occupation, all employees



Sources: ABS (*Characteristics of Employment, Australia, August 2021, Cat. no. 6333.0*); ABS (*Employee Earnings, August 2022, Cat. no. 6337.0*).

Should there be a regional dimension?

There has long been a concern to meet the skill needs of regional Australia. These can be different, as evident during the resources boom, when there was an imperative to attract skilled labour to remote areas, and for professions like general practitioners that can be in short supply in some regional areas. However, arguments that the thresholds should be different across regions are not compelling:

- Shortages are often resolved through high wages. A floor for an employer-sponsored visa can readily be exceeded and so the proposed thresholds do not bind in that instance.
- Regional areas have long been served by visa streams other than employer sponsorship — such as working holiday makers for temporary migrants — which can relieve the needs for certain types of transient lower-wage workers. International students in regional universities can also provide labour in areas where there are regional universities.
- Regional skill shortages are often due to barriers to geographic mobility other than visa status.

Age is a consideration for income thresholds and eligibility for permanent employer sponsored visas

While \$85 000 for permanent employer-sponsored migrants is a good starting threshold, there are strong grounds for it to rise with age. While some employers may require more experienced people to fill higher-level vacancies, doing so via permanent (as opposed to temporary) migration comes at higher fiscal costs, given that modelling suggests skilled migrants have a negative expected fiscal impact above 48 years of age (Varela et al. 2021). This problem could be resolved by raising the income threshold with age, but removing eligibility for a permanent employer-sponsored visa at some older age. Complexity would be reduced (and certainty for applicants and employers increased) by only having a few age-dependent thresholds, rather than a continuously rising level. No age limit or relationship between age and income thresholds should apply to temporary employer-sponsored visas as there are no equivalent fiscal considerations.

The age limit for permanent employer-sponsored visas should consider the onshore labour market experience of applicants who were formerly in Australia on temporary visas. As noted in section 2.1, a migrant's true fiscal impact over their lifetime includes their stay from the 'date of first arrival', which may include continuous periods under temporary migration visas (including bridging visas). It would be counterproductive for permanent residency pathways to punish migrants for holding temporary visas (which allow migrants to prove their value in the labour market). Doing so may discourage some highly able people from applying for temporary migration visas if they see that as the pathway to permanency. Accounting for a migrant's age and continuous periods of temporary migration may require evidence of labour market outcomes over the duration of their stay.



Recommendation 7.2

Implementing wage thresholds for employer sponsored visas

The Australian Government should remove current list-based restrictions for employer-sponsored temporary and permanent skilled visas and set an income threshold well above the Temporary Skilled Migration Income Threshold rate. The income threshold that applies to temporary migration should be lower than for permanent. The income threshold for employer-sponsored permanent visas should increase with age, though at some older age, people would no longer be eligible for this visa category.

2.7 Reforming the points-based system

As for employer-nominated visas, being on a skills list would no longer be a *prerequisite* for eligibility for the points-based visa stream. However, any characteristic of an applicant, including their occupation, could independently feature in the model determining eligibility so long as its inclusion was a material and empirically-verified predictor of positive labour market and fiscal outcomes (as discussed further below).

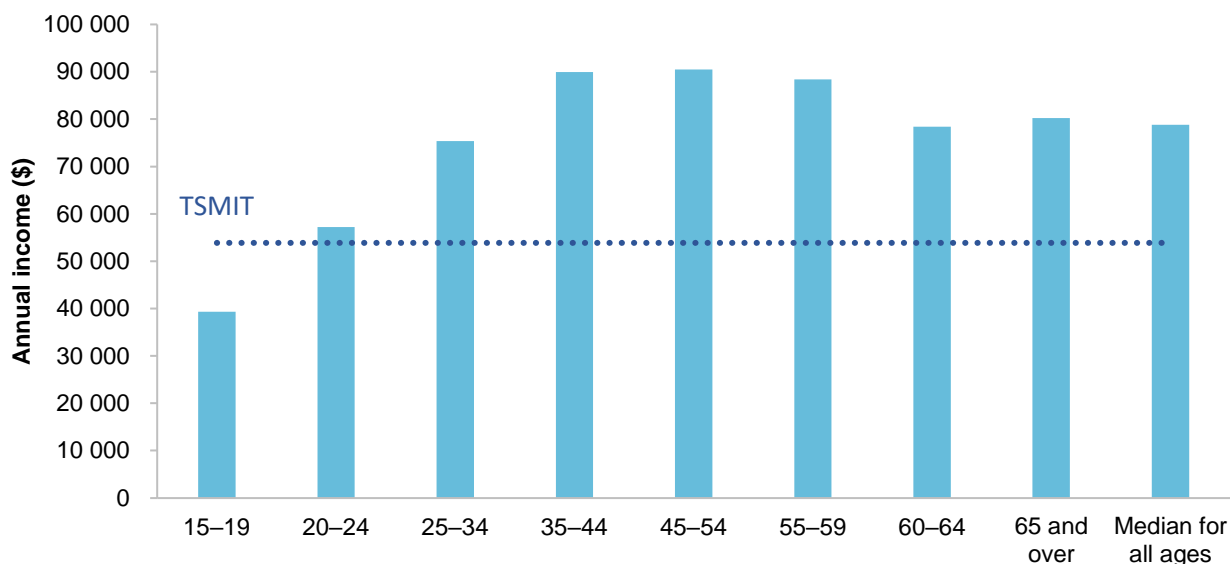
Prima facie, the points-based system could place more emphasis on ongoing employment and its quality (in terms of skill and income level) which would help to improve the composition of the skilled independent migrant intake.¹⁸

- Points could be awarded for current employment at a sufficiently high skill level, weighted by income level for a given age group. This would help to identify applicants who are outperforming their peers at different stages of their career.
- Points awarded for work experience could also be weighted by income level, to better reflect quality rather than simply duration.
- Additional points could be awarded to secondary applicants for their current ongoing skilled employment and according to current salary level. This would help to better acknowledge the impacts of secondary applicants.

Accounting for the interaction between age and income would be useful given that income varies over the people’s lifetimes. For instance, people earning an income of \$80 000 or \$90 000 would be well above the median if they were aged under 30 years, but below the median for those aged 35 to 55 years (figure 2.10). Any advantage given to applicants at those income levels would disproportionately favour those at older ages. A set of income thresholds or benchmarks would help identify high achievers within different age-groups.

Figure 2.10 – Salary thresholds have implications for the applicants affected

Median wages by age, 2022



Source: ABS (*Employee Earnings*, August 2022, Cat. no. 6337.0).

Such changes would also better acknowledge the role of age in the points system. For instance, more points are currently awarded for people in the 25–33 year age bracket than in the 18–25 year age group. This

¹⁸ The points system already recognises skilled employment experience. However, the points allocated to work experience are geared towards past experience, benefiting applicants who are 8 years into their career.

means that a person with a high-paying job at age 24 years is treated as less desirable than someone with the same job at age 26 years.

Continuous improvement of the points system

The points system should be reviewed regularly and subjected to ongoing econometric analysis to re-assess and refine the factors that lead to good labour market and fiscal outcomes.¹⁹ The evidence suggests that beyond the changes related to age and income discussed above, there are other factors whose weight in the points-based system should be re-assessed.

It is important that the weight given to different educational qualifications reflects their value in the labour market. For instance, if doctorate degrees are not associated with improved labour market outcomes, they should not be given additional points above Bachelor or Masters qualifications (although this may vary by field of study). At the same time, professional credentials (such as chartered status for engineers and accountants) have strong links to employment outcomes. Where there is evidence of a strong link with employment outcomes, such credentials could also be rewarded under the points system.

It may also be possible to refine the treatment of the migration unit, to better capture the fiscal effects of secondary applicants. This already occurs to some degree in the points system, but could be refined with better empirical evidence over time.

Table 2.4 – The points system for the Skilled Independent visa could be improved^b

	Points	Potential improvement
Age		
At least 18 but less than 25 years	25	The points awarded for the 25–33 year age group should be in line with the 18–25 year age group. Additional points should be awarded according to current salary level, with the thresholds and points varying by age group.
At least 25 but less than 33 years	30	
At least 33 but less than 40 years	25	
At least 40 but less than 45 years	15	
45 years and over	0	
Overseas skilled employment		
Less than 3 years	0	The points allocated to work experience are geared towards past experience, benefiting applicants who are 8 years into their career. However, more emphasis could be put on current ongoing employment at a sufficiently high skill level, weighted by income level for a given age group, as this would produce a better indicator of labour market outcomes.
At least 3 but less than 5 years	5	
At least 5 years but less than 8 years	10	
At least 8 years	15	
Australian skilled employment		
Less than 1 year	5	
At least 1 but less than 3 years	10	
At least 3 but less than 5 years	15	
At least 8 years	20	

¹⁹ Some evidence suggests that past attempts to better target the migrant intake failed to improve outcomes. For instance, Tani (2020) highlights that migrants' skills and qualifications were often underutilised, at times, in spite of changes to policy that aimed to target particular characteristics.

	Points	Potential improvement
Educational qualifications		
Doctorate	20	If doctorate degrees are not associated with improved labour market outcomes, they should not be given additional points above Bachelor or Master's qualifications. Given that doctorate degrees fill specific technical needs that could not otherwise be met, these needs should be met through facilitation of employer sponsorship.
Bachelor	15	
Diploma or trade qualification	10	
Occupational qualification	10	
English language skills		
Competent	0	English language skills should be presumed to be proficient for migrants from English-speaking countries, or for those who have had certified English training in their home country. Tertiary education providers should be encouraged to certify students' English language skills as evidenced through the completion of their studies.
Proficient	10	
Superior	20	
Partner skills		
Depending on age, English language, nominated skilled occupation, and skills assessment	5–10	It may be reasonable to consider the outcomes of partners.
Other^a	Up to 20	

a. An additional 5 points (each) is allocated to eligible applicants who meet the following criteria: Australian study requirements; professional year in Australia; credentialed community language; and study in regional Australia.

Source: Department of Home Affairs.

Other improvements may be possible, including to the treatment of English language skills. While the Productivity Commission (2016b) previously found that English language skills are a useful predictor of labour market success, it may be possible to more efficiently test and certify them. For instance, English language skills could be presumed to be proficient for migrants from English-speaking countries, or for those who have had certified English training in their home country. Australian tertiary education providers could be authorised and encouraged to certify students' English language skills as an additional part of the completion of their studies.



Recommendation 7.3 Improving Skilled Independent visas

For the Skilled Independent visa (subclass 189), the Australian Government should remove current list-based restrictions, but the points system should be able to award points for any factors shown to be associated with fiscal and employment benefits. Additional points should be awarded for ongoing employment in Australia according to income level, with different income benchmarks for different age groups. Moreover, the design of the points system should be updated regularly based on empirical research.

2.8 Meeting employment needs in human services and care work

The largely-publicly-funded human services sector (which includes aged and disability care) faces complex labour and skill needs. The sector has often relied heavily on migrant labour to meet service demand, reflecting both ongoing growth in demand (due in part to population ageing) and factors limiting domestic labour supply. Shortages of labour are endemic, affecting the quality of care for vulnerable people. It has proven particularly difficult to attract workers in aged care, an issue that is likely to intensify given policy initiatives to raise staff-to-resident ratios, accompanied by the pressures of an ageing population (CEDA 2021b, pp. 14–15). To meet the 2023 target for additional caring time for residents, caring staff numbers would need to rise by more than 12% from 2022 to 2023 (Sutton and Ma 2022). Capacity constraints, among other factors, have led to long and growing waits for access to services (PC 2022f). Adding to these workforce pressures, a recent survey found that 75% of workers were considering leaving the sector in the next five years (PC 2022b, p. 77). With regard to the aged care workforce:

Many recent reviews have diagnosed a plethora of issues that have made the sector a comparatively unattractive and difficult place to work. The sector has struggled to attract and retain enough staff to keep pace with the demand for care and support services as the number of Australians aged over 65 years has continued to grow. The past few years have seen the expansion of home care in particular, as more older Australians choose to live at home for as long as feasible. ... Based on the current trajectory, various projections point to an increase in this shortfall of care workers over the coming decades. (PC 2022c, p. 3)

Difficulties in recruiting in the disability sector are equally severe (NDS 2021).

The Productivity Commission's recommendations to increase the wage threshold for eligibility for Employer Nominated and Skilled Independent visas could aggravate these shortages by reducing the supply of lower-paid migrant workers in some caring occupations and industries. The degree to which this occurs depends on the relative importance of skilled migrants in caring occupations and associated industries, and the likelihood they will lose eligibility for migration under the new system. The evidence suggests that low-paid skilled migrants are *not* the main source of overall migrant labour supply in the relevant parts of the labour market:²⁰

- In 2016, skilled temporary and permanent migrants accounted for 36% of all migrants working as carers and aides, while they accounted for 43% of all migrants working in residential aged care. The remaining migrants working in these occupations and industries were predominantly from the humanitarian, New Zealand, student and family migrant streams, which are not affected by the proposed changes to skilled migration visas.
- Moreover, skilled migrants in caring occupations and industries are often employed as professionals. Their typically higher pay rates means many of these are likely to remain eligible for the new skilled streams. The share of skilled migrants working in lower-skilled occupations in caring industries is significantly lower than the shares shown above. For example, skilled migrants categorised as labourers and community and personal service workers (lower-skill occupations) comprise only about 25% of the total migrant residential aged care workforce.

²⁰ Based on data from ABS 2019, *Microdata: Australian Census and Temporary Entrants Integrated Dataset, 2016* and ABS 2019, *Microdata: Australian Census and Temporary Entrants Integrated Dataset, 2016*.

Moreover, the Fair Work Commission's interim decision to raise minimum award wages for direct care workers by 15% from mid-2023 will probably elicit some additional labour supply — or at least reduce the outflow of workers.

Notwithstanding these counteracting factors, a shift in visa eligibility thresholds would be likely to worsen staff shortages. There are several policy options.

One possibility is to leave it to the labour market to resolve any emerging shortages, letting wages rise so that people shift from other parts of the economy into the caring sector. However, while wage adjustments in labour markets are usually effective in moving labour around the economy, this dynamic may be less effective in this critical area:

- Governments are key funders of care services. While larger and more regular wage increases may be possible, the growing demand for care workers discussed above and the financial difficulties experienced by providers will magnify the fiscal pressures facing government.²¹ Governments have many competing spending priorities. This constrains their ability to increase spending on any one area without significant tax increases, which have their own negative impacts on growth and efficiency (via the marginal excess burden of tax).
- There are non-wage barriers to labour supply from incumbent Australians, such as geographic barriers (given that service delivery often takes place at the service user's location) and mismatch of skills and preferences (given that face-to-face care work, while technically lower-skilled, would not suit everyone's capabilities or preferences).
- Attracting and retaining carers may depend not only on entry-level wages, but expected incomes over a person's career. In some care positions, there is likely to be limited scope for the kind of income progression that might occur in other industries (via promotion to managerial positions, movement to higher-paying firms, or by increasing productivity at the individual level).

One measure that could sidestep the fiscal constraints governments face in meeting growing needs for aged care services would be a new model designed to ensure sustainable funding of aged care. In its report into Australia's aged care system, the Productivity Commission proposed re-balancing public and private contributions to create a sustainable source of revenue (PC 2011a, chapter 8). There are alternatives that could achieve similar outcomes, such as a universal competitive mandatory insurance scheme (Ergas and Paolucci 2011). The formula determining the combined private and public funding could be set at a level sufficient to pay the wages to attract workers to aged care from either Australian citizens or, where wages were high enough, from the new skilled visa streams.

In the absence of such new funding models and the risk of government fiscal constraints, there may be grounds for a specialist visa stream for caring skills that would set a lower wage threshold than recommended by the Productivity Commission for other skilled visas. For example, CEDA suggested an 'Essential Skills Visa' for areas of 'critical need' such as aged care, childcare, disability or healthcare, and require appropriate qualifications, English proficiency, and a job offer from an Australian employer (p. 20). They noted that this would recognise:

... there is considerable unmet demand for labour in areas like aged care, where there are currently no direct work-visa pathways. Eligible occupations would be tightly controlled, with regular enforcement and compliance to prevent misuse and exploitation. (Ball 2022, p. 13)

Canada has a similar scheme — the Home Support Worker Pilot — though it is more targeted than CEDA's model.

Essentially, targeting a visa by occupation or sector is similar in principle to the current use of occupational lists. However, its deliberately restricted scope would mean that the practical challenges of identifying

²¹ For example, 55% of residential aged care providers were making net losses in 2020-21 (DOHA 2022, p. 4). Losses per residential aged care resident for directly-provided government services were about five times the average (p. 122).

shortages would be limited — likely to services where governments play a significant role as provider, funder, and regulator. Reliance on the list would be limited to one visa stream, and only in the context of reformed Employer Nominated and Skilled Independent streams.

A visa stream that targeted human services would also need to ensure that applicants worked in those occupations for a significant period of time, without unduly restricting job mobility between businesses and agencies. (The capacity for mobility is critical to avoid the risk that an employer could lower employment standards by threatening visa cancellation if the worker did not comply.) This is similar in principle to the use of Regional Sponsored visas, which require a period of time be spent living in a regional area, but ultimately allowing broader movement later on. A period of 3–4 years may be appropriate as a minimum amount of time spent in the identified sectors.

Given that skilled migration is not the primary source of migrants working in lower-paid parts of caring occupations, the scale of any new specialist visa stream may not need to be large. It would also be undesirable to set in stone any new specialist visa category as there may be other developments in the caring occupations that increase domestic supply — such as better working conditions and improving the attractiveness of caring as a profession (Swerissen 2022). In addition, the Fair Work Commission has not ruled out additional minimum pay increases following its interim determination, which will affect the domestic supply of labour. Consequently, the specialist visa should be a pilot.



Recommendation 7.4

Meeting the needs of human services without stifling wage increases

The Australian Government should introduce a pilot of a special permanent visa subclass for occupations in human services sectors largely funded by government (such as aged and disability care), but only if these are facing likely enduring and significant labour shortages that are weakly responsive to wage increases. The visa subclass should be subject to the current Temporary Skilled Migration Income Threshold, and include a condition that the applicant remain employed in the relevant sector for 4 years.

The pilot should be evaluated for its impacts and need after several years.

It should also be abandoned if the Australian Government develops sustainable alternative funding options for aged care that are sufficient to meet the wage increases required to limit labour shortages.

2.9 Temporary migration and pathways to permanent residency

Temporary skilled migration plays two roles: it caters to workers and employers who have an immediate commercial need, with no intention of extension to permanence; and it presents a pathway for migrants to ‘try before they buy’ and decide whether they wish to adopt Australia as a permanent home. Between 2000-01 and 2013-14, 55% of temporary skilled visa holders transitioned to permanent residency (Treasury & Home Affairs 2018, p. 21). Both roles could be enhanced, particularly in the context of recommended changes to permanent migration.

Facilitating longer-duration temporary skilled migration

A better-designed temporary skilled migration visa could reduce employers' reliance on permanent migration — which produces less fiscal benefits and is subject to annual caps. A re-designed visa could also address the risk under the Productivity Commission's refined eligibility criteria for the permanent stream that the labour market could lose the skills and expertise of more experienced and older migrant workers (particularly if they are not attracted to the limited duration of the TSS visa).²²

Increasing the duration of temporary migration would better cater to the medium-term needs of migrants and sponsoring employers. As the Business Council of Australia noted:

Two years is too short a time for many migrants who are weighing up the costs and uncertainty involved in moving to Australia. It is also often too short a stint for potential employers, especially given the months it takes to process visas and then bring people into the country and get them up-to-speed. (BCA 2022, p. 26)

To the extent that the targeting of the TSS is improved, and applicants contribute complementary skills in the labour market, there is likely little downside risk from allowing longer durations of temporary skilled migration. An allowed duration of somewhere between 5 to 7 years would make the costs of relocation more worthwhile and extend the share of a migrant's career spent in Australia, while avoiding the fiscal costs of the retirement phase.

The exact duration should be subject to consideration of short-term impacts on State and Territory services, housing and urban planning, and Australia's overall ability to absorb increases in the population. However, there is likely to be significant value in gradually increasing the duration of the TSS to make the visa more attractive to migrants and more worthwhile for employers.

Temporary to permanent pathways

Strengthening the pathway from temporary to permanent migration help attract and retain talented skilled workers (BCA 2022; CEDA 2022b). The time spent by temporary migrants in the labour market allows them to test their relationship with their sponsoring employer(s) and their value in the broader labour market (particularly if changes are made to improve labour mobility, discussed in section 2.11). The evidence shows that temporary visa holders with higher incomes also achieve higher rates of wage growth (figure 2.11). For government, the labour market experiences of temporary migrants helps identify those most suited to gaining permanent residency.

These pathways could help to reduce underemployment among migrants with high-level qualifications, given the evidence of mismatches (discussed in section 2.1) suggests that qualifications are a necessary but not sufficient condition to work in skilled occupations. The risk of underemployment could be reduced by shifting away from the presumption that qualifications will, in their own right, lead directly to permanent residency.

²² The medium-term stream of the TSS visa has a duration of 4 years (or 5 years for Hong Kong residents) with the potential to apply for renewal, while the short-term stream is up to 2 years (Home Affairs 2021c).

Figure 2.11 – Temporary skilled migrants with higher starting salaries have stronger wage growth

Average annual wage increase during temporary skilled visa



Source: Coates et al. (2022).

Pathways for recent graduates

This shift to better recognition of employment and income in permanent migration is also relevant to international students who have completed an Australian qualification but lack proven experience in the labour market. As noted by Prof. Julia Horne:

The policy settings for this group have for many decades sought to largely prevent international students from settling in Australia rather than encourage them. Yet, the cohort is young and Australian-educated, thus potentially able to contribute in significant and long-term ways to Australia's future productivity. (sub. 169, p. 2)

A reasonable expectation might be that obtaining an Australian qualification would be accompanied by a temporary visa that allows sufficient time to test the labour market and undertake some early-career work. It would not necessarily guarantee permanent residency, but would improve the chances of eligibility for permanent residency. Australian qualifications should be considered as providing opportunities to begin a skilled career in Australia, rather than guaranteeing a retirement in Australia.

Australia is likely to face increasing competition for graduates, whose job prospects would often be as strong in Australia as overseas. Pathways for recent graduates have received renewed attention from policymakers in other advanced economies following the pandemic, including the United Kingdom, where temporary visa options open to recent graduates (including those studying outside the United Kingdom) were recently extended.²³ Canada too has a relatively clear pathway for international students to become permanent residents (VETASSESS, sub. 157, p. 12).

²³ The United Kingdom recently implemented a temporary visa to attract recent graduates from a list of universities ranked in the top 50 (on two or more ranking lists), regardless of their field of study and without the need for an offer of employment. The visa allows graduates to stay in the United Kingdom for 2 or 3 years, depending on their qualifications,

It is important that temporary migration options — such as the Graduate visa (subclass 485) — are of a sufficient duration to allow graduates to compete as legitimate candidates for entry-level positions.²⁴ This could be achieved by allowing an extended temporary visa for Graduate visa holders with proof of an employment offer (subject to skill and/or income requirements). This could help Australia retain more of the best and brightest locally-trained international students, specifically by rewarding those who successfully begin careers in highly-skilled and highly-paid occupations in Australia.²⁵

Age at application or arrival?

If the Productivity Commission's recommendations are adopted to ensure permanent migration visas account for age-related fiscal risks, this can have implications for the pathways to permanent residency. For instance, spending more time on temporary visas could be seen as detrimental to a migrant's chances of permanent migration, as they would apply for permanency at later ages. This would work counter to reforms intended to encourage more use of temporary migration, and to better use the pathways from temporary to permanent migration.

Accordingly, in designing thresholds and criteria for permanent migration, it would be valuable to acknowledge that migrants' cumulative contributions to productivity and fiscal outcomes accrue from the time of first arrival in Australia, rather than at the time permanent residency is granted. This could occur, for instance, by awarding additional points for past work experience that are weighted according to income level (as discussed above).



Recommendation 7.5

Improving temporary migration and pathways to permanent residency

The Australian Government should amend settings for temporary skilled migration to increase their duration to 6 years, subject to continuous employment (for a set percentage of a given year) with a sponsoring employer (with the ability to move to a new sponsoring employer under the same visa).

While temporary skilled migration visas should not come with an expectation of permanent migration, pathways to permanent migration should be available under revised Employer Nominated and Skilled Independent visas.

For international students, obtaining a qualification from an Australian tertiary education provider should be associated with some expectation of being able to test their skills in the Australian labour market, but not an expectation that their qualification alone will qualify them for permanent residency. The Australian Government should increase the duration of stay for Temporary Graduate visas (subclass 485) for graduates with Bachelor and higher level degrees, such that an extension to five years is guaranteed subject to proof of ongoing employment above a set wage threshold.

These changes should be subject to the revised employer-sponsored and independent skilled visas, both of which would place greater emphasis on age and income (recommendations 7.2 and 7.3).

without the possibility of renewal — rather, they are intended for visa holders to test the labour market and potentially to transition to other streams of skilled migration (Government of the United Kingdom 2022).

²⁴ Graduate visas (Subclass 485) are available in Australia, to graduates from Australian institutions who are current or recent holders of the Student (Subclass 500) visa.

²⁵ Particularly given that only 16% of Student visa holders transitioned to permanent residency between 2000-01 and 2013-14 (Treasury & Home Affairs 2018, p. 21).

2.10 Avoiding backlogs where possible

Backlogs are an inevitability in any system with caps and an excess demand for visas, but different designs of migration systems have varying implications for their severity and impact. Taking as given that governments set caps based on population policy, the main issue is therefore the degree to which visa criteria dampens demand. The more than such criteria fulfill that function, the more certainty that this gives an aspiring migrant that they will be a successful applicant in any given year, which in turn makes Australia an attractive destination.

Skills lists are one way of rationing places and their abandonment, if not replaced, would tend to expand demand and increase backlogs (VETASSESS, sub. 157, p. 4). However, there are superior ways of containing demand while meeting Australia's skilled migration needs. The Productivity Commission's proposals for permanent migration eligibility for sponsored and independent visas also include features (income, work experience and age) that reduce demand.

Regardless, oversubscription to visa programs should prompt governments to consider the scope of the migrant intake, particularly if the eligibility criteria have been well-calibrated to productivity and fiscal outcomes. If, over time, the Australian Government observes consistent oversubscription from applicants who meet well-designed criteria and eligibility mechanisms (i.e. that have high-level skills, ongoing employment and good career prospects) this would be useful in informing decisions about the scale of the migration intake.

2.11 Removing barriers that migrants face in the labour market

As discussed in section 2.1, some migrants find it more difficult to get jobs matching their skills than the broader population. These challenges may be reduced by providing settlement services and assistance with the labour market transition (including information provision) either by government or industry bodies, as suggested by Engineers Australia. While that may be warranted if the hoped-for labour market outcomes of a permanent migrant are not realised, the Productivity Commission's recommended changes to the permanent migration system (and the transition to it from temporary migration) should significantly reduce the need for such assistance.

A more difficult problem relates to employer preferences for Australian qualifications and local work experience (Engineers Australia 2021; Tani 2020, Chartered Accountants Australia, sub. 94, p. 3). However, there is likely to be limited scope for policy or regulation to alter such preferences unless they contravene anti-discrimination laws.

Governments are likely to be more influential in addressing barriers that stem more directly from policy and regulatory settings, which include the:

- effect that visa conditions may have on labour market mobility
- recognition of skills and qualifications.

Addressing barriers in the labour market would give policy makers a more accurate understanding of the characteristics to target in the migration intake. As noted by the Grattan Institute, barriers in the labour market at an early stage of a migrant's career can have ongoing consequences for their career path, and hence their lifetime earnings and fiscal impact (Coates, Wiltshire and Reysenbach 2022).

Visa conditions and labour market mobility

Given the required contributions to the Skilling Australians Fund Levy, the (modest) sponsorship application fee and the on-costs of hiring and training, employers will only be willing to sponsor migrants if there is a good prospect of reasonable tenure. Equally, many sponsored migrants will benefit from an uninterrupted period of learning on the job. They cannot freely move until a new sponsoring employer has an approved nomination. Therefore, by design, job mobility is constrained for employer-nominated migrants. Similarly, employers are subject to conditions if they wish to change the migrant's routine hours of work or their duties.

These rigidities involve their own impacts. For example, job mobility has economy-wide implications, as it is an avenue for resources to flow to more productive firms in a competitive labour market. For the visa holder, there is also a balance between expectations of attachment to the sponsoring employer and the risk that if the restrictions are too significant, they may be subject to an increased risk of exploitation.

Existing arrangements may not have the balance between the gains from enduring attachment to the sponsoring employer and the visa holder. For example, there are grounds for allowing a short period of unemployment accompanied by job search by a visa holder for another employer willing to sponsor them without violating the terms of the visa (Coates, Sherrell and Mackey 2022). Improving the job mobility associated with employer-sponsored visas should be considered regardless of other changes to those visa streams recommended in this report. However, such measures will be of greater importance if sponsorship is made available to a broader set of employers and industries (recommendation 7.2). To the extent that better job mobility reduce worker exploitation, improving settings for job mobility will be vital if employer sponsorship is to continue below the 'high income threshold' (as per recommendation 7.2).



Recommendation 7.6 Improving job mobility for employer-sponsored visas

The Australian Government should amend settings for employer-sponsored temporary and permanent visas to better allow workers to switch to competing employer-sponsors including by permitting a short period of unemployment while looking for a new sponsor.

Recognising migrants' skills and qualifications

There are likely to be opportunities to further improve productivity by pursuing greater recognition of overseas occupational licensing, as well as through further reform to the design of licensing schemes. This particularly relates to boundary issues in scope of practice. (The scope of practice defines the activities and types of work that are covered by an occupational licence.)

For migrant workers, occupational licensing presents further barriers to obtaining employment in Australia through requiring additional assessment of their qualifications on top of any skill assessments for immigration requirements, sometimes at considerable cost to them. This can create a secondary layer of approvals for skilled migrants that, in some cases, could be made more efficient through two mechanisms:

- alignment between skills assessments and licence/registration processes
- mutual recognition of international qualifications and licenses.

The design of occupational licensing and its use in Australia in the context of other forms of regulation are discussed in chapter 3.

Mutual recognition of international qualifications and licences

A necessary condition for mutual recognition between international jurisdictions is that there is sufficient alignment or equivalence of different licensing regimes as this would preserve the benefits of licensing in promoting safety and quality of service. Indeed, mutual recognition improves coordination of enforcement and deregistration between jurisdictions. Information is more readily available to regulators about operators that had received sanctions or whose occupational licences had been disqualified in other jurisdictions.

Where mutual recognition is possible, it would benefit productivity by lowering barriers to entry for skilled migrants, improving the availability of skills for Australian employers. It would also better allow foreign firms and contractors to provide services directly to Australia (i.e. trade in services).

Australia already has some such arrangements in place. The Trans-Tasman Mutual Recognition Agreement (TTMRA) allows mutual recognition of occupational licenses between Australia and New Zealand.

Furthermore, some occupational bodies have their own international mutual recognition of qualifications and licences with additional jurisdictions (e.g. Engineers Australia and Chartered Public Accountants Australia).

While the Productivity Commission's 2015 review into Mutual Recognition Schemes (between Australia and New Zealand) found many stakeholders supported recognition for registered occupations, in practice regulators sometimes maintained restrictions. They were rejecting applications because of differences in jurisdictional occupation standards required to obtain or retain a licence despite the occupational activities being substantially the same and/or not making use of conditional licensing to account for differences in standards between jurisdictions (PC 2015b, pp. 131–144).

Expanding international mutual recognition schemes beyond New Zealand would not necessarily change the source countries of Australia's skilled migrants but could make the process of recognition more efficient, avoiding unnecessary costs of re-training, and allow better use of some migrants' skills once they arrive. The process of expanding mutual recognition schemes could usefully follow the principles established in the Global Convention on the Recognition of Qualifications concerning Higher Education (the UNESCO Convention), which provides the framework for broad scale international mutual recognition.

While other international agreements have addressed qualification recognition, the UNESCO Convention is the first to define that 'substantial difference' must be found for a qualification to not be recognised. This approach creates a positive default to recognise international qualifications, rather than not, putting the onus on the recognition authority to show that there are substantial differences between qualifications. If this approach were adopted and expanded to mutual recognition for international occupational licences, it would shift the onus onto regulatory bodies to show why an international licence is not equivalent for jurisdictions in which a mutual recognition treaty is in effect. This could be a useful approach to the (still incremental) expansion of mutual recognition to more jurisdictions, based on mutual recognition agreements and co-operation between regulators in multiple jurisdictions.

Even where international occupational licences substantially differ from the domestic licences, it may be useful in some cases for regulators to grant conditional or restricted licenses. This could involve, for example, restrictions that limit the tasks an international worker could perform if a domestic licence is broader than its international equivalent. Regulatory bodies would only have the power to refuse registration if false or misleading information were provided by the international licence holder, or equivalence could not be achieved by imposing restrictions or conditions.



Recommendation 7.7

Expanding the default recognition of international licences

Australian governments and regulators should pursue further international mutual recognition of occupational licences by improving (and potentially formalising) links between Australian licensing bodies and those in similar countries.

Should international recognition be automatic?

The Productivity Commission's 2015 review into Mutual Recognition Schemes concluded that the priority should be on extending *Automatic* Mutual Recognition within Australia and strengthening the TTMRA. While there has been a significant expansion of AMR since the 2015 review, there is still a lack of evidence on the effectiveness of the Australian scheme.

It would be valuable to assess the impacts of AMR within Australia to identify the issues relevant to further expansion. For instance, it may be possible to assess how the experiences of participating jurisdictions have differed from those of non-participating jurisdiction, and the impact of exemptions. It will be useful to assess the incremental expansion of the scheme and disruptions caused by COVID-19.

Expanding the number of jurisdictions with non-automatic international mutual recognition agreements is also a higher priority than establishing AMR with international jurisdictions. Any expansion of AMR to international jurisdictions could be trialled with New Zealand, where the TTMRA has long been in place, to provide evidence of how effective an international AMR would be.

Alignment of assessments

For jurisdictions where mutual recognition is yet to be implemented, or substantial differences are found between international and Australian occupational licensing, it would be valuable to align requirements for migration with the requirements of regulatory bodies. At present, connections between the requirements of the skills assessment and the licensing/registration requirements do not exist — they are effectively separately assessed.

This can result in skilled persons immigrating through a skilled visa but not able to work in Australia in their preferred occupation — either as their qualifications are not recognised or the occupational licence requires Australian work experience (box 2.4). This essentially redirects parts of the skilled migration intake towards unskilled occupations (CEDA 2022c, p. 11). This adversely affects a migrant's early career in Australia, which can have flow-on effects for their ongoing labour market prospects and productivity.

Box 2.4 – Skilled migrant limbo

The experiences of migrants nurses and electricians provide examples of the inconsistency between the outcomes of a skills assessment required to satisfy visa eligibility and occupational licensing requirements.

Nurses

Nurses and midwives who want to work in Australia must be registered with the Nursing and Midwifery Board of Australia (NMBA). For a nurse or midwife with international qualifications to migrate to Australia, they must undergo assessment of their international qualifications by the Australian Health Practitioner

Box 2.4 – Skilled migrant limbo

Regulation Agency (AHPRA) and a separate skills assessment by the Australian Nursing and Midwifery Accreditation Council (ANMAC).

The outcome of the AHPRA assessment is the determinant for registration with the NMBA, whereas the ANMAC assessment is used to determine an applicant's ability to immigrate to Australia.

Both assessments are designed to test the suitability of the applicant to be able to work in Australia as a nurse or midwife, however, the ANMAC skills assessment takes into consideration work experience, which AHPRA (as governed by the Health Practitioner Regulation National Law) does not consider. Assessment by AHPRA can only consider whether the international qualifications are substantially equivalent to an Australian qualification.

For relevant but not substantially equivalent international qualifications, an outcomes-based assessment (OBA) was established in 2020, consisting of both multiple choice and clinical examinations (NMBA 2020).

Electricians

To be legally certified as an electrician in Australia requires a state or territory electrical license. To obtain an Australian electrical license, applicants must show evidence of their attainment of a Certificate III in an electrical trade course from a recognised training provider.

On the other hand, to satisfy the requirements of Australia's migration program, internationally qualified electricians can have their overseas qualifications and work experience recognised through the Offshore Skills Assessment Program (OSAP) or the Temporary Skills Shortage Skills Assessment (TSSSA).

But OSAP and TSSSA recognition are not deemed to be equivalent to the Certificate III requirement, and hence suitably recognised internationally qualified electricians cannot legally operate in Australia. Rather, internationally qualified electricians are required to undertake at least 12 months of Australian work experience under the supervision of a licensed electrician in order to apply for a Certificate III and obtain an unrestricted electrical licence to work unsupervised.

The requirement for 12 months of work experience can leave internationally qualified electricians in limbo if they are unable to find an employer that will provide them with supervised work experience.

While expansion of mutual recognition of international licences may be a long-term solution for many jurisdictions, a useful policy objective in the interim could be to adapt migration assessments to make them consistent with the criteria for any relevant registration tests. The licensing regimes for nursing and electricians highlight lessons that could be considered among licensing regimes more broadly. For instance, registration processes can often be improved through better bridging processes. In cases where regulators require further Australian work experience for licensing, skilled migration could be closely linked to actual employment opportunities to ensure internationally qualified practitioners can acquire the local work experience needed for the licence. Such changes would increase the employability of migrants entering through the skilled migration pathway, with flow on benefits to productivity.

Alignment between the requirements of skilled migration and occupational licensing would also reduce duplication of processes. Where the requirements are misaligned, skilled migrants are required to progress through two separate, but ultimately similar, processes to determine their suitability to work in Australia. This may involve providing the same documentation to two separate assessors and two different tests to as

required. By aligning the requirements, these processes would be streamlined, making it faster and less costly for skilled migrants to enter and begin work in Australia.

There may also be a case for some of the licensing regimes to adapt their approaches to recognising experience gained in trusted jurisdictions. As an example, the Nursing and Midwifery Board of Australia only considers the *initial* nursing qualification and specifies that only qualifications from a limited number of jurisdictions²⁶ are likely to meet the registration criteria. Contradictions arise for nurses who may have migrated from their home country (which is not accepted as a ‘trusted jurisdiction’) to a country that Australia accepts as a ‘trusted jurisdiction’. In such cases, if the migrant undertakes further education and gains registration and experience in the ‘trusted jurisdiction’, the Australian registration system would still focus on their initial qualification.²⁷ If the migration requirements were to move to the registration requirements, without a mutual recognition system in place, the pool of skilled migrant nurses available to work in Australia would be unnecessarily limited. In cases such as these, it would be more beneficial for the licensor to loosen their requirements and align with the skilled migration assessor rather than the other way around.

Potential redundancy of some assessments

Skills assessments are required as part of the Skilled Independent, Employer Nominated and TSS skilled visas. Assessments are undertaken for migration purposes as an integrity measure (i.e. to ensure an applicant who is qualified on paper is *actually* a qualified applicant). As described by VETASSESS:

The assessment of the credentials, relevant experience and other characteristics of migrants skilled in occupations on the lists, serves the purpose of providing employers with confidence that migrants have the qualities that match their needs. Which, in turn, makes it more likely that migrants work in roles that put their skills to their most suited and productive use. In this sense the lists also assist in making best use of migrants’ human capital. (sub. 157, p. 2)

However, this is less likely to be the case where employers have already hired and/or sponsored the applicants given that they are uniquely situated to determine and observe what skills and attributes are required for the occupation.

In addition, the assessment process can create compliance costs for all participants, including those using the system in good faith. The Business Council of Australia noted:

In some occupations, such as for chefs, there is a large backlog created by the fact that there are few assessors. ... For occupations without specific regulatory requirements, this is an additional administrative hurdle which adds limited value. Employers who are sourcing candidates from overseas are best placed to determine if a candidate meets the requirements for the role. (BCA 2022, p. 20)

Skills assessments are required for a range of occupations that do not have formal licensing in place. For these occupations, skills assessments for migration are undertaken by non-experts (i.e. those not qualified or practicing in the field). While such assessments can contribute to the integrity of the visa program, it is unclear how much additional value they add for applicants who have documented proof of formal qualifications or indeed have obtained employment or sponsorship in a highly-skilled field. In many cases, these processes would not justify the costs for both applicants and administration, noting that typical processing times are estimated to be between 12 and 20 weeks for non-trade occupations (VETASSESS 2023).

²⁶ Canada, Hong Kong, the Republic of Ireland, the United Kingdom and the United States are the only jurisdictions where qualifications are likely to meet the criteria.

²⁷ For example, a nurse with EU qualifications that migrated to the United Kingdom where their qualifications were recognised (pre-Brexit) and has worked as a nurse in the United Kingdom for several years may be unable to work as a nurse in Australia, despite UK qualifications being recognized by the NMBA.



Recommendation 7.8

Aligning migration and occupational license requirements

Australian governments and regulators should coordinate to align skilled migration requirements with occupational license recognition requirements, including by removing duplication of assessment where possible.

3. Occupational licensing and registration

Key points

- ✳ **Occupational licensing must balance the benefits to consumer protection and the costs of restricted competition. Ineffective or unnecessarily costly regulatory protections reduce productivity for little or no additional consumer benefit.**
 - Governments should not approach licensing reform as a choice between safety and efficiency. Rather, given the costs associated with licensing are potentially substantial, licensing should only be used where more cost-effective alternative options are unavailable, and its coverage kept to the minimum necessary to achieve its benefit.
 - Some deregulation has occurred in low-risk occupations, however, there has been a significant expansion of coverage and entry requirements for licences aiming to improve health and safety. The balance and design of regulation could be improved.
- ✳ **Better data and evidence of licensing outcomes, particularly their impact on health and safety risks, would inform more proportionate responses.**
 - Cost benefit analysis of licensing is often constrained by a lack of evidence, leaving regulators to rely on partial and anecdotal evidence from stakeholders on perceived health and safety risks.
 - Licensing is often used in conjunction with other consumer protections with little evidence or analysis of the additional net benefit it brings.
- ✳ **There is evidence of scope for productivity and competition gains from reforming scope of practice in several licensed occupations without compromising safety and service quality.**
 - Funding arrangements for nurse practitioners should be reformed to ensure they are providing services at their full capabilities. Trialling of pharmacist prescribing should be pursued by all states and territories, supported by rigorous evaluation and appropriate funding arrangements.
- ✳ **Substantial improvement to licensing policy, and consumer regulation more generally, will require governments to invest in a coordinated, long-term strategy to ensure licensing is fit-for-purpose in a modern service economy.**
 - While individual states and territories are responsible for driving this process, it will need to be supported by a national reform agenda with support from the Australian Government.
 - Priority should be given to further investment in digital licensing platforms that can underpin a better regulatory approach to licensing.

3.1 Licensing and productivity

In the labour market, occupations may be subject to formal licensing, registration, or regulated statutory minimum requirements (henceforth referred to as ‘licensing’) that act as a signal of proficiency and quality of work output to employers and consumers. When working efficiently, licensing helps to:

- address externalities such as safety outcomes and the quality of services
- decrease information asymmetries between consumers and businesses and/or between employees and employers
- enable targeted interventions for ongoing training and enforcement of compliance and disciplinary measures
- raise human capital formation where market signals fail to properly price skills and experience.

At the same time, by restricting the pool of workers who can provide particular services, licensing can limit entry into a market, restrict choice and increase prices. When licensing restricts entry into a market, it can act as a barrier to productivity growth that could occur *within* firms and *between* firms (Bambalaite, Nicoletti and von Rueden 2020).

- Within a firm, higher entry requirements can result in lower competition from new market entrants. This can restrict access to skilled professionals, reduce the incentive to innovate and produce an over-reliance on the licence as a signal of quality. Furthermore, within an occupation if a licence is overly rigid in its regulation of tasks, this may impede on-the-job skill formation.
- Between firms, productivity growth results when highly productive firms have a better ability to attract skilled workers compared with lower productivity firms. Licensing may act to reduce this reallocation of labour; particularly where professional skills overlap and further formal training disincentivises mobility among workers. For instance, highly skilled practitioners with many years’ industry and teaching experience may be valuable to a school but short in supply if these professionals are disincentivised to change career due to formal re-training requirements that are onerous and costly.

Much of the available evidence supports the idea that licensing stringency reduces market competition (figure 3.1).

While the international evidence on licensing and productivity may be difficult to apply directly to Australia,²⁸ the available evidence shows that the costs of licensing can be significant. A growing body of empirical literature generally finds that occupational licensing increases labour market rigidities, and hence likely decreases productivity, with findings relatively consistent across countries and occupations (box 3.1).

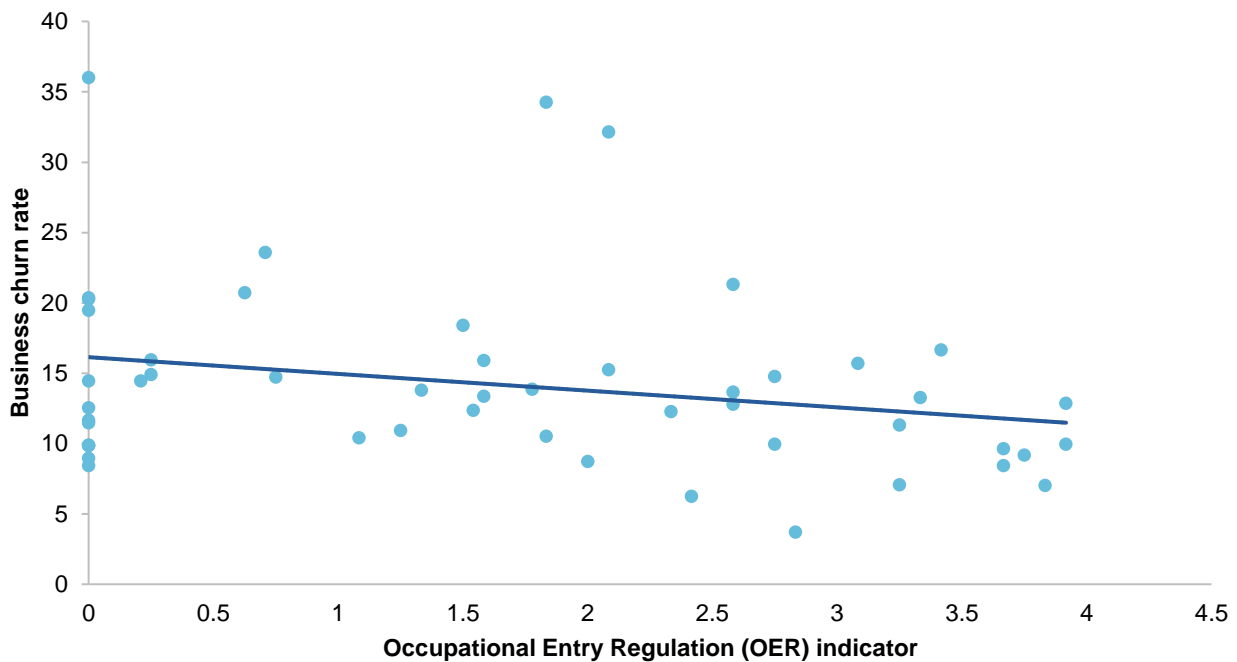
The administrative costs of licensing (e.g. the raising of fee revenue) can also be a significant economic cost — in 2014, total annual licensing fees were over \$600 million across the Australian economy.²⁹ Some have argued that licensing fees are necessary to fund regulatory activities (Senate Red Tape Committee 2018). From this perspective, licensing acts as an industry levy, and removing this source of revenue would either reduce the resources available for regulation or shift the costs of regulation to those outside the industry. However, this is generally not a strong argument to guide the design or use of occupational licensing, given the economy-wide impacts of licensing policy (both in terms of effectiveness and its costs) would outweigh the fiscal benefit of collecting licensing fees. Indeed, some governments have undertaken to remove fees

²⁸ The international evidence may be of limited applicability to Australia (given the differences in licensing regimes and labour markets) but some lessons can be drawn from international experiences (given the relatively consistent findings across countries). A significant amount of research would be needed to better understand the impact of all of Australia’s licensing regimes, across different occupations and jurisdictions.

²⁹ Estimates in 2014 dollars based on average licensing fees from the Productivity Commission’s *Survey of occupation-registration authorities* (PC 2015b). This would be the equivalent of roughly \$760 million in 2022 dollars.

from some permits in the post-pandemic recovery (such as the ACT's hawkker licence) or remove licensing requirements altogether (such as for commercial agents in New South Wales).

Figure 3.1 – Stricter licensing requirements are correlated with lower competition
Business churn and licensing stringency in Europe, 2014 – 2016^a



a. Each dot represents one country-sector cell, where sectors correspond to one of the occupations covered by the Occupational Entry Regulation (OER) indicator (e.g. architectural activities in Spain). The OER indicator measures different areas of regulation (administrative, qualification and mobility requirements) and different types of regulation (licensing, a situation in which only supervisors require a license, and certification). Business churn is defined as the sum of enterprise births and enterprise deaths divided by the number of active enterprises. The set of countries used includes Belgium, Finland, France, Germany, Hungary, Italy, Portugal, Slovenia, Spain, Sweden, and the United Kingdom.

Source: Bambalaite, Nicoletti and Rueden (2020).

It is likely that reform to occupational licensing would lead to significant productivity gains. CEDA (2022c) use the OECD's estimate of productivity gains from reducing occupational licensing stringency to estimate the potential benefit to Australia. Noting that the restrictiveness of licensing in Queensland is comparable to Germany or Canada (according to the OECD's Occupational Entry Regulation indicator), CEDA estimates that reducing licensing stringency would generate up to \$5 billion each year for the Australian economy, assuming similar scope for gains across all states and territories despite some variation in licensing stringency (p. 9).³⁰

While it is difficult to model the impacts of licensing reform accurately, indicative estimates suggest that significant economy-wide productivity gains could be achieved if labour productivity improved in industries that use licensing (such as 'construction', 'transport and wholesale', 'professional, scientific and technical services', 'school education' and 'health and social services') (volume 9). However, these estimates should only be taken as indicative of the potential economic gains, as they do not capture potential impacts on service quality and safety outcomes.

³⁰ This is not unreasonable given CEDA finds similar levels of licensing restrictiveness in New South Wales, and most states have/or are implementing similar licensing approaches to the occupations measured by the OER indicator, e.g. plumbers, nurses, electricians, architects, lawyers and civil engineers.

Box 3.1 – International evidence on licensing and productivity

Licensing can reduce labour mobility, employment and increase wages of licensees

Johnson and Kleiner (2020) analysed interstate migration of 22 occupations in the United States. They found that long-distance migration (defined as greater than 50 miles) was 7% lower for individuals in state specific licensed occupations compared with individuals of quasi-national licensed occupations.

Blair and Chung (2019) estimated the effect of licensing on employment in the United States. They compared employment outcomes for neighbouring counties along state borders, where the occupation was licensed in one state but unlicensed in the other. They estimated that the presence of occupational licensing in a county reduced the equilibrium labour supply by an average of 17–27%.

Pizzola and Tabarrok (2017) investigated the wage premium for occupational licensing, looking at the delicensing of funeral services in Colorado that occurred in 1983. Using a difference-in-difference methodology and the delicensing event, the authors estimated that licensing requirements for funeral services created a 11–12% wage premium.

Similar results have been observed in the European Union for wage premia. Koumenta and Pagliero (2019) analyse data from the EU Survey of Regulated Occupations using a cross sectional regression for wages and control for human capital, industry, occupation and country fixed effects. The authors find that on average having a licence is associated with 4% higher hourly wages.

Licensing is associated with reduced productivity

The OECD (2020) conducted an analysis across US and EU states on the impact to firm-level productivity from occupational licensing — or occupational entry regulation (OER) — using an indicator that captured administrative burdens, qualification requirements and mobility restrictions. The study found OER tended to be correlated with less dynamism and lower labour mobility among firms.

Using a model of firm productivity growth based on growth at the productivity frontier and distance of a firm from that frontier, the study found that significant reform (a 1-point reduction in the OER indicator) led to a 1.6 percentage point increase in labour productivity of the average firm. Furthermore, they find this association is stronger for firms closer to the productivity frontier, with the most productive firms experiencing nearly double the negative impact to labour productivity.

Benefits of licensing are less evident but can be difficult to measure

While the costs of licensing are often easily observable, the benefits are unlikely to translate to aggregate indicators of output and productivity. However, research in Europe and the United States has failed to find evidence of improved service quality in a range of industries using more targeted measures of quality such as medical records, consumer complaints, customer surveys and safety outcomes (Kleiner and Kudrle 2000; Powell and Vorotnikov 2012; Koumenta, Pagliero and Rostam-Afschar 2019; Farronato et al. 2020) although some evidence shows that licensing healthcare professionals can improve outcomes (Anderson et al. 2016). Some caution is needed when interpreting these results because the benefits of licensing are, by their nature, more difficult to estimate than costs. For instance:

- Quality can be difficult to accurately measure — Farronato et al (2020) failed to find evidence of quality implied by consumer reviews and re-use of the service. Some consumer safety or quality issues that take time to manifest, and the effect of a change in policy may not be captured unless sufficient time has passed (p. 32).

Box 3.1 – International evidence on licensing and productivity

- Where licensing aims to ensure minimum training or expertise, some of the associated benefit may relate to the more difficult and less common circumstances — hence aiming to avoid incidents of greater severity and lower likelihood. The change in the rate of such incidents may be difficult to measure.
- Licensing systems can vary greatly across countries, industries and occupations, which means indicators of licensing and quality may not always be relevant or comparable.
- The use of de-registration, negative licensing, and other restrictions as a means of prohibiting bad actors from practicing may only capture a small minority of practitioners. As such, its effect may be small at the aggregate level, and any additional assurance provided to the end-consumer may be difficult to measure.

Recent licensing reform in Australia

In Australia, about 18% of employed people were in an occupation requiring registration of some kind in 2011 (PC 2015b), which is similar to other advanced economies.³¹ Some occupational licences are assessed by state and territory governments (e.g. construction licences), while others are assessed by a national (e.g. medical licence) or state and territory-based (e.g. legal practising certificates) regulatory board.

While licensing reform is often pursued to expand coverage or increase requirements to better protect quality and safety, some deregulation has occurred where there are lower risks to the consumer and they are more easily alleviated through improvements in the functioning of competitive markets or alternative forms of consumer regulation (such as through the provision of information).

Between 1996 and 2000, under the National Competition Policy deregulation agenda, Australian governments either reformed or abolished a number of occupational licences, including for hairdressers, employment agents, podiatrists, real estate agents, dentists, veterinarians and conveyancing services. These reforms typically involved removing categories of protected work or reducing the scope of licensed practice to improve competition and lower prices (PC 2005).

There has been less deregulation activity since the initial wave of National Competition Policy reforms, although many jurisdictions have continued to implement changes focusing on reducing compliance burdens associated with licensing (for instance, by redesigning scope of practice or reducing renewal timeframes). In some cases, deregulation has involved the implementation of a ‘negative licensing’ system, which allows for the prohibition of businesses or individuals from practice in a particular occupation, but involves no prior approval nor a formal (positive) licence for practitioners.

In the past decade, state and territory governments have found additional scope to implement negative licensing. For example:

- in 2014, the Queensland Government implemented negative licensing for debt collectors who operate without face-to-face contact (under the *Debt Collectors (Field Agents and Collection Agents) Regulation 2014* (Qld))
- in 2015, unregistered health practitioners were regulated through a national code of conduct (COAG Health Council 2015)

³¹ In 2015, the average share of workers that were licensed across US states was 25% and the average share across EU countries was 22% (von Rueden and Bambalaite 2020).

- in 2016, a negative licensing regime came into effect for South Australia's tattoo industry, with the expressed aim to 'ban organised crime gangs and second-hand dealers and pawnbrokers from owning or controlling tattoo parlours' (Government of South Australia 2016, p. 35)
- in 2022, New South Wales introduced a negative licensing scheme for those who had no face-to-face contact with debtors and easing of licensing requirements for field agents.

The NSW Productivity Commission recommended that negative licensing be considered for occupations where there is low risk of consumer harm (as an alternative to formal licensing but in conjunction with other consumer protections) (NSW PC 2021). By contrast, licensing is often appropriate where there are material risks to public health and safety.

However, risk of consumer harm alone is not necessarily grounds for all forms of positive licensing — the additional requirements in a licensing scheme must be proportionate to the problem identified and clearly linked to reductions in consumer harm. Indeed, there are a variety of approaches used across advanced economies, with different requirements applied to low and high-risk occupations (box 3.2).

Australian jurisdictions also vary in their approaches. In 2008, the Productivity Commission identified nearly 100 occupations requiring licensing and found over 70 were not consistently licensed in all jurisdictions, while only 26 were (PC 2008, p. 489). This inconsistency continues today — for instance car repair mechanics are only licensed in New South Wales and Western Australia, and there is varied approaches to licensing motor vehicle salespersons, yard managers and car market operators (DMIRS 2019); likewise, low risk building trades such as fencing, plasterers and painters are only licensed in some states and to varying degrees (NSW PC 2021). Even where states and territories are broadly aligned on the use of an occupational licence, considerable variation can exist in terms of minimum requirements, regulatory frameworks, legislative instruments, terminology, and the classes or categories of work that are regulated.

In some cases, the challenge in licensing policy may be less about whether to license at all, but rather how licences should be designed. In other cases, the extent of safety risk (and the effectiveness of licensing as a solution) may be unclear.

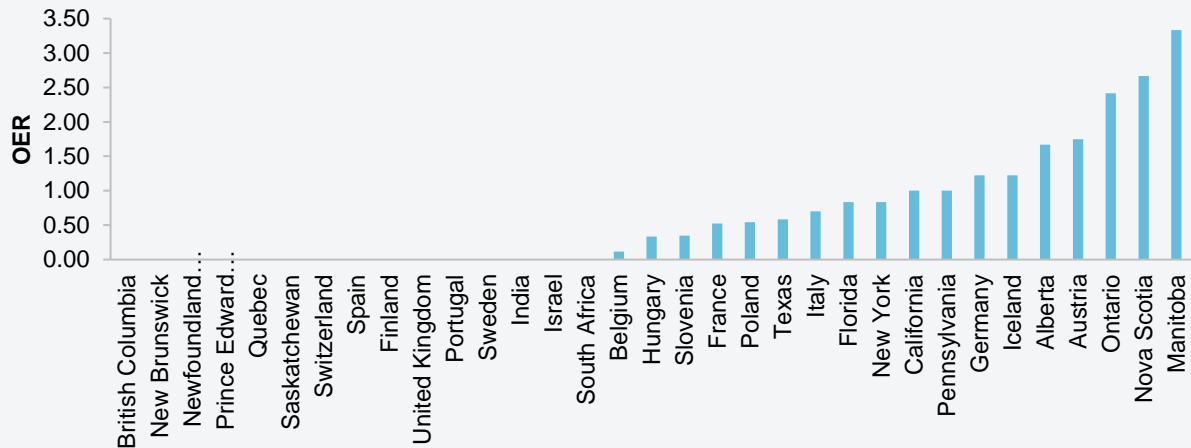
Box 3.2 – Occupational entry regulation indicators

Countries differ in their approach to licensing — there is no consensus on its role among other forms of regulation, with some countries favouring market mechanisms and self-regulation. Indeed, several forms of regulation would typically be used with regard to safety and quality of services. As such, it is not straightforward that more stringent licensing would always improve health, safety, or quality outcomes, particularly if those objectives are already achieved more efficiently by other means.

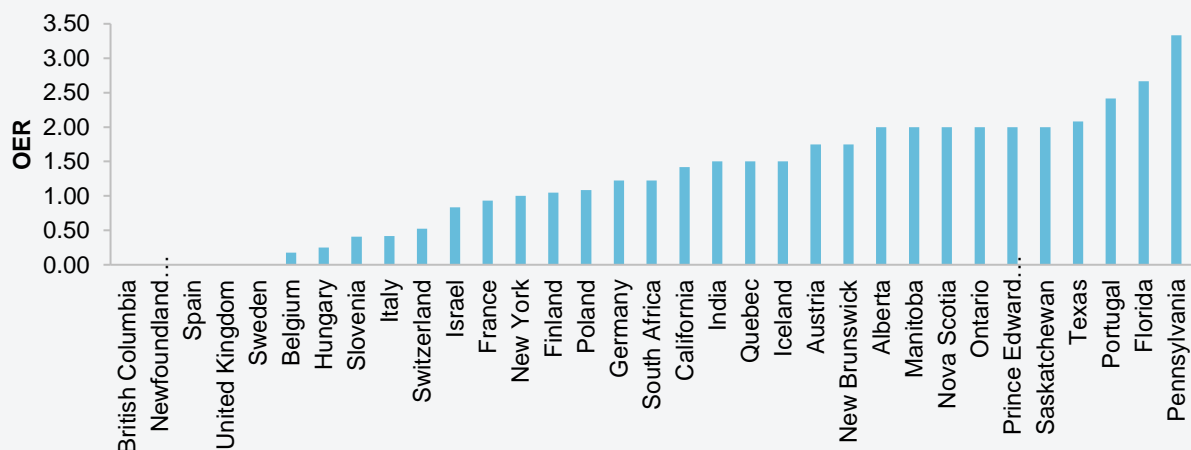
The OECD's occupational entry regulation indicator (OER) measures licensing stringency across a range of occupations and countries and finds considerable variation in both low-risk occupations such as hairdressers and even higher risk occupations like electricians. In fact, many European countries have little to no requirements for electricians to be licensed. These differences in single occupations often reflect broader trends in the different approaches countries take in regulating certain sectors. In the United Kingdom for instance, construction and building trades utilise industry-led certification schemes. In Sweden, company self-auditing schemes are relied upon, allowing electricians to be covered by a company's scheme rather than independently licensed.

Box 3.2 – Occupational entry regulation indicators

Hairdressers



Electricians



Source: von Rueden and Bambalaite (2020).

The next challenges for licensing policy

Australian governments recently introduced automatic mutual recognition to reduce interstate restrictions and alleviate rigidities caused by inconsistent licensing systems. However, national efforts to reform licensing systems themselves have largely failed, with ad-hoc reform driven by states and territories to varying degrees. A renewed approach to licensing reform is needed to ensure it is guided by the best available evidence and delivering licensing systems that are fit-for-purpose.

- Licensing has become more stringent in recent years in areas where safety is a concern, but such decisions are often informed by limited evidence of safety issues, the efficacy of increased licensing and scant consideration of alternative forms of regulation (section 3.2).
- At the same time, well-known issues regarding scope of practice between licensed occupations remain unresolved. In this context, reforms could reduce barriers to competition without compromising safety and service quality (and in some cases improving them) (section 3.3).

- The introduction of digital licensing provides another avenue for consumers to access information about services beyond that already provided by digital platforms and the internet. Government's will need to investigate these changes and re-evaluate the use of licensing where digital innovations may be providing better answers. Digital licensing also provides opportunities to improve data sharing for mutual recognition arrangements, current compliance activity, and analytics to both monitor trends in licensing and assess the effectiveness of reform (section 3.4).

3.2 Is licensing the best way of improving safety?

A challenge for policymakers is to balance objectives relating to service quality (such as public safety and consumer welfare) and those relating to competition (such as the creation of barriers to entry). The Harper review advised that:

Professional and occupational licensing can promote important public policy aims, such as quality, safety and consumer protection. ... Competition considerations should not override these objectives — but neither should they be ignored. (Harper et al. 2015, p. 140)

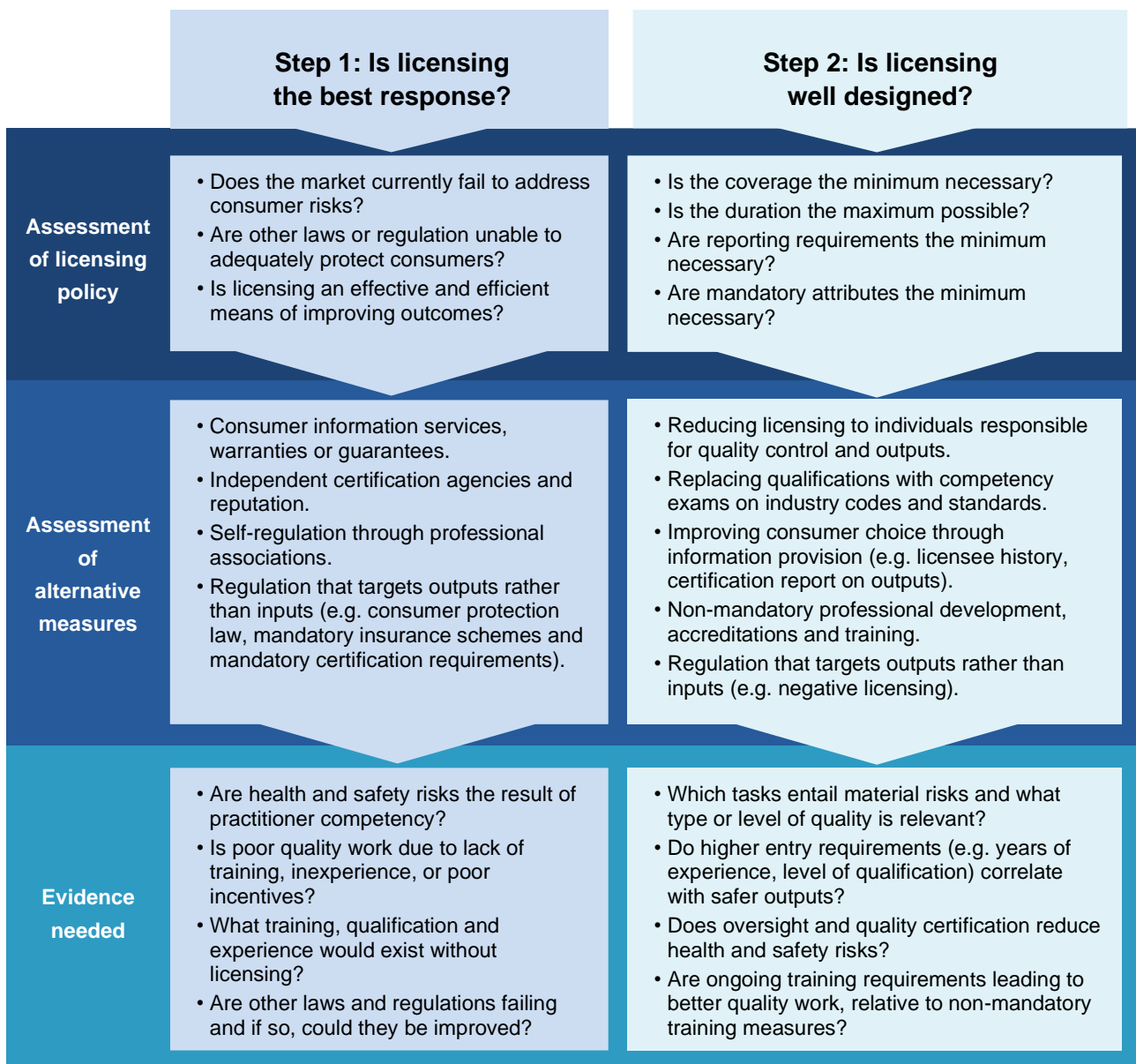
Productivity objectives are not necessarily in conflict with public safety. To the extent that restrictive regulations reduce the accessibility and quality of services, such restrictions can work against the very objectives licensing seeks to achieve — the quality and safety of services provided to consumers. Such trade-offs are particularly evident in sectors where public health and safety outcomes can be negatively influenced by:

- both poor quality service delivery *and* by the lack of access to services themselves
- poor incentives to produce high-quality work where consumer choice is constrained.

Governments should not approach licensing reform as a choice between safety and efficiency. Rather, given the costs associated with licensing have the potential to be substantial, licensing should only be used where alternative options are unavailable, and its coverage kept to the minimum necessary to achieve its benefit (IPART NSW 2014; PC 2015b).

If safety and other forms of service quality can be achieved or improved with less stringent licensing, this would likely result in significant productivity gains. However, determining the appropriateness of licensing among several regulatory options or pursuing a proportionate approach is often constrained by limited evidence. This is one reason jurisdictions can vary in licensing requirements.

Indeed, the failure of the National Occupational Licensing Scheme in 2014 was in part due to the inability for jurisdictions to agree on uniform licensing requirements and disagreement about a perceived 'lowest common denominator' approach being taken to nationally consistent requirements (PC 2015b, p. 35; ACCI 2018). For policy makers to pursue an outcomes-based approach to safety regulation consistently and effectively, improving current gaps in evidence and understanding of licensing outcomes will need to be prioritised (figure 3.2).

Figure 3.2 – Licensing in an outcomes-based approach to safety regulation^a

a. Adapted from PwC and IPART's licensing framework.

Sources: IPART (2014); PwC (2013).

The expanding role of licensing in health and safety regulation

Overall, Australia's licensing is relatively stringent where safety is concerned (CEDA 2022c). Health and safety concerns continue to be cited as the primary justification for licensing by industry and reform has tended to expand coverage rather than reduce it (Senate Red Tape Committee 2018, p. 12). Justifications for licensing are particularly strong in the healthcare sector because the potential for consumer detriment from a poor choice is significant and product information and quality verification are difficult to obtain (PC 2008, p. 93).

The relationship between licensing and safety outcomes can be less straightforward in other sectors. For instance, in building and construction, the mix of services involve both high and low risks to health and safety, and quality is verified at multiple stages of production. In addition, consumers vary in their knowledge and sophistication — in a large commercial construction project, for instance, there may be less potential for information asymmetry between subcontractors to contractors than there might be between individual consumers and service providers.

This can make determining the minimum necessary level of licensing difficult. For instance, a licence to contract for work can be useful to enforce compliance with building standards. However, it is less clear whether those carrying out the work should also be licensed if supervision and certification of quality and compliance are already provided by the contractor and/or licensed supervisor. While the licensing of practitioners might ensure a minimum qualification level (increasing the likelihood that standards *can* be met), it does little to ensure those practitioners deliver quality work on any given day. It also has the potential to restrict skill formation, flexibility, and innovation in how a business completes the work.

In the building and construction sector,³² licensing arrangements have become more stringent across most jurisdictions in the past five years, with either higher entry requirements or more extensive coverage for licensed work, including:

- In Victoria, the ability for plumbers to contract for work will now require additional 2 years of experience on top of passing a licence exam (DELWP 2018; Victorian Government 2019); Electricians require mandatory continuous professional development (CPD) and those doing line work now need a separate licence (ESV 2020), new licensing and registration for subcontractors and employees across a range of building trades (beginning with carpenters in 2023); further licensing reform has been proposed to restrict scope of practice for classes of building work and implement new licence categories developed for complex and/or high-risk work (Victorian Government 2021).
- In New South Wales, new registration requirements and mandatory CPD for Design Practitioners, Building Practitioners and Professional Engineers working on class 2 buildings (NSW Fair Trading 2023); introduction of medical gas licences that cover fitters, technicians, and mechanical services workers (NSW Fair Trading 2022); proposed expansion of building practitioner licensing to the commercial industry (DCS 2022).
- In Queensland, mechanical service occupational licences covering medical gas and air conditioning and refrigeration work (DHPW 2019).
- In Western Australia, the introduction of registration for professional and technical building engineers (DMIRS 2022b); proposed additional mandatory training in CPR and low voltage rescue for electricians (DMIRS 2022a); proposed introduction of tiered building licences to limit scope of work to specific building classes and expansion of licensing to remote areas previously exempt (DMIRS 2022c).
- In South Australia, an accredited professionals scheme for planners, building certifiers, land surveyors and other industry professionals involved in making development decisions (DIT 2019).

Strengthening licensing arrangements in building and construction may be justified where the benefits outweigh the costs and suitable alternatives are not available. In many instances, however, reforms are characterised by poor assessment of health and safety risks and inadequate consideration of whether alternative regulation already addresses the problem — largely as a result of insufficient evidence to inform policy (discussed below).

³² Building and construction is broadly defined and includes some trade licenses that also operate outside of construction.

These characteristics of licensing reform are not unique to building and construction but provide a useful case study of the challenges that most licensing regimes face when aiming to protect health and safety.

High risk ratings by default

When determining if licensing is appropriate, the Independent Pricing and Regulatory Tribunal of New South Wales (IPART) and PwC recommend conducting a simple risk assessment to determine the potential cost or detriment of the absence government action, and whether this detriment is sufficiently high to warrant licensing. This assessment depends on both the likelihood of a negative event occurring and the consequences of that negative event if it did occur (IPART NSW 2014, p. 45). Where there is limited evidence available to guide the assessment of risk, or it is not possible to accurately estimate the probability of safety risks occurring, it is difficult to establish the extent to which licensing is appropriate.

Despite this, a risk assessment can still result in a high-risk rating where the probability of the incident cannot be accurately estimated, and hypothetical or anecdotal evidence is used to suggest the detriment is high. As noted by the Senate Select Committee on Red Tape (2018), the evidence base provided by industry participants as part of regulatory assessments is often entirely anecdotal. This typically includes reference to unquantified safety risks or claims of poor practice among competitors. Without quantifiable evidence to evaluate these claims, high-risk ratings become the default position in licensing assessment and typically outweigh consideration of negative impacts on competition and productivity (box 3.3).

In many cases, risk assessments that have been driven by anecdote have either led to more stringent licensing conditions, or have prevented deregulation. For instance in New South Wales, some building trades such as painters, plasterers and decorators continue to be licensed despite insufficient evidence of significant risks to safety or financial detriment (IPART NSW 2014; NSW Fair Trading 2018; NSW PC 2021).

High risk ratings can also become the default position where high profile incidents of public safety failure amplify the downside risks. Once licensing of an occupation has been introduced to protect health and safety it can be difficult to reverse or relax these requirements, regardless of whether there is evidence that skills and qualifications had been the cause of poor safety outcomes, or that licensing is the most effective solution. As such, concerns about public safety often lead to pressure to increase the stringency of licensing arrangements — this has been evident in the recent decision to extend mandatory licensing and registration to engineers (box 3.4).

Box 3.3 – Refrigeration and Air Conditioning licences in Queensland

In 2020, the Queensland government introduced a new mechanical services licensing framework that covered new specialist streams in plumbing, refrigeration and air conditioning and medical gas. Two changes were significant for Refrigeration and Air Conditioning (RAC) work:

- the introduction of an occupational licence class for RAC work
- the inclusion of a minimum two-years relevant experience to obtain a contractor licence.

This licensing framework was implemented as an addition to the national refrigerant handling licence issued by the Australian Refrigeration Council that is required for individuals who install, service or repair air conditioning equipment. RAC industry bodies argued that current arrangements allowed 'periphery' trades such as plumbers and electricians to complete similar work in Queensland:

Underestimating the vital importance and safety requirements of a skill based trade licence instead of a mechanical service licence will undoubtedly determine the HVAC&R industries survival and parity alongside other peripheral trades like plumbers and electricians ... since the establishment of the ARCTick licensing scheme in 2005 to handle refrigerants, this has seen the proliferation of lesser qualifications in a Certificate II training packages for split/systems installers (substandard courses offered over 1 and 2 days). The substandard courses have resulted in unsafe, inefficient works carried out by electricians, plumbers' even gardeners. (TPWC 2018, p. 47)

However, supporting evidence of unsafe outcomes in Australia, let alone Queensland, either does not exist, or is not well founded. Stakeholders gave qualitative evidence on unsafe work practices in relation to dangerous refrigerants and pointed to one death in India and two deaths in Victoria the cause of which had yet to be determined, but according to the Australian Refrigeration Association was 'highly likely ... a result of unlicensed persons working on a non-compliant refrigeration system containing a flammable refrigerant' (TPWC 2018, p. 48).

The Queensland government also cited concerns for the potential for legionella bacteria to spread in air conditioning systems, which can pose significant health risks in hospitals and aged-care facilities (DHPW 2019, p. 4). But no evidence on the incidence of this risk or link with unlicensed workers was publicly provided and it remains unclear whether licensing would be more effective than other regulatory intervention, such as testing and treatment activities under health and safety laws.

Box 3.4 – Licensing and registration of engineers

The Opal and Mascot Tower incidents

Over 2018 and 2019, separate incidents of structural cracking were discovered in the Opal and Mascot Tower's, leading to evacuation and concern about their potential collapse. Technical reports on the Mascot Tower were not made public but an independent report commissioned into the Opal tower incident found causes of the observed damage were largely related to changes made after the original design and exacerbated by construction issues (Carter, Hoffman and Foster 2019, p. 16).

Regarding certification of the building, the reviewers found no evidence that the building certifiers had been deficient in regard to statutory expectations but suggested there was evidence that checks for

Box 3.4 – Licensing and registration of engineers

compliance were either not taken or taken with insufficient rigour (Carter, Hoffman and Foster 2019, p. 14). It was recommended that review processes be primarily strengthened through:

- creation of a registry of engineers
- independent third-party certification of engineering designs
- regime of critical stage, on-site inspections by an independent registered engineer.

While the review largely focused on certification and approval in the design and construction of buildings, the incident has been commonly cited as evidence to justify broader mandatory registration of engineers that most states and territories have now implemented or are in the process of implementing (DISR 2019; DCS 2022; DMIRS 2022b).

Would mandatory registration of engineers have prevented the incidents?

While there is evidence that some designs and workmanship did not meet standards, this was often nuanced technical failings in conjunction with coordination issues between different practitioner expertise. The evidence did not establish that practitioners involved in this work had qualifications and/or experience below minimum requirements that could be attributable to the design and workmanship failings. As the reviewers themselves noted:

Australia is also home to some of the world's best architects, design engineers and construction companies who enjoy high international reputations for their work globally, including the firms associated with the design and construction of the Opal Tower. (Carter, Hoffman and Foster 2019, p. 14)

Indeed, the firm responsible for the structural design, WSP, is a global professional services firm of considerable reputation, market size and resources. It is doubtful they would employ engineers below minimum standards in qualifications and experience as set out by mandatory engineering registration.

Previous work by the Productivity Commission into public infrastructure investigated the validity of mandatory engineering registration in Australia. Similar high-profile engineering failures were mentioned by stakeholders, yet the evidence suggested these failures involved senior and accredited engineers (PC 2014c, p. 586). Queensland was the only state at the time to have a mandatory registration scheme in place but there was little evidence it had improved outcomes relative to other jurisdictions. The Commission concluded that mandatory registration was not justified given a lack of evidence that labour market mechanisms were failing to ensure a necessary level of quality:

Businesses that hire engineers are able to screen them during the hiring process, and to dismiss them if they are not proficient. In this sense, the conceptual grounds for mandating registration do not appear strong. (PC 2014c, p. 587)

There continues to be little evidence that mandatory registration is a necessary or efficient mechanism to improve engineering services to protect public safety.

Alternative avenues for reform

Subsequent court proceedings between the contractors involved in the work demonstrated critical failings in coordination. It was claimed that Evolution (who designed, manufactured, and installed the precast wall panels for the building) made changes to the shop drawings that proposed a change to the grouting that was subsequently identified as a cause for the structural defects. WSP denied approving these changes,

Box 3.4 – Licensing and registration of engineers

alleging that Evolution engaged in deceptive or misleading conduct by failing to expressly raise the design changes with WSP before commencing with the work (Supreme Court of New South Wales 2022).

This appears to reflect a perennial problem faced by many countries in how to effectively manage complex high-rise residential constructions. International research into the challenges associated with building complex structures have highlighted the challenge of maintaining the ‘golden thread’ of information. This is where information on the original design intent and subsequent changes are captured, maintained, and used to support safety decisions (Oswald et al. 2021). The details of this incident suggest reform aimed at improving accountability, coordination and information sharing between contractors is likely to have the greatest impact.

The role of licensing in the context of other safety regulation

In determining the role of licensing, IPART and PwC (2014) recommends policy makers consider all regulatory and non-regulatory options for achieving the desired objective. Indeed, safety regulation takes many forms aside from the licensing of practitioners, including product safety under the Australian Consumer Law, work health and safety law, and industry-specific codes and regulations (such as the national construction standards under the Building Code of Australia).

Establishing the minimum necessary regulation for a particular objective would ideally involve consideration of multiple forms of regulation, including less restrictive mechanisms (such as industry self-regulation) or more flexible approaches (such as risk-based regulation). Despite this, when health and safety claims lead to a high-risk rating, other forms of consumer regulation are often pursued as an *addition* to licensing rather than an alternative. For instance, recent licensing reform across most states and territories in building and construction have been driven by growing concern about defects and complaints in the industry, but this has occurred in addition to a range of other regulatory changes, and with little evidence of the benefit of further licensing (box 3.5).

The reform efforts have been led by the Building Minister’s Forum and guided by a report they commissioned into improving compliance with the National Construction Code (NCC). The report recommended several changes to the licensing of building practitioners that included an expanded range of licensed categories, additional competency and qualification requirements and compulsory CPD on the NCC (Shergold and Weir 2018).

These reforms were recommended alongside broader regulatory changes aimed at improving signals of product quality and enforcing accountability for services provided. The focus on output quality and consumer choice is a consequence of the performance-based approach of the NCC:

The code sets out explicit objectives, listed as a hierarchy of requirements. It is not intended to be overly prescriptive. Designers and builders have the capacity to find creative solutions to meet the performance requirements ... This is to be contrasted with traditional prescribed building codes that mandate specific construction practices. There are clear economic and aesthetic benefits to a performance-based approach: new techniques can be introduced to increase productivity; new products and innovative technologies can be applied to reduce costs or widen choice; and new creative architectural design is encouraged. (Shergold and Weir 2018, p. 9)

Box 3.5 – Defects and complaints in the building and construction industry

Efforts to reform the building and construction industry have been underway across most states and territories due to problems with product quality and public safety. This view has been prompted by high profile safety failures in multi-storey buildings, the high incidence of defects and complaints from home buyers, and industry feedback on the systematic failings in the current regulatory environment (Shergold and Weir 2018). In response, licensing changes have been recommended or implemented within a suite of regulatory reforms aimed at broadly improving standards in the sector (DISR 2019). However, it is unclear whether further licensing would create additional benefit given the lack of evidence establishing a clear link between quality issues and weak licensing arrangements.

Defects, complaints, and safety failings in multi-story buildings are a common issue internationally, despite considerable variation in the approach to licensing and registration (The World Bank 2013; Oswald et al. 2021). As CEDA points out, it is questionable whether further licensing is warranted given stringent licensing arrangements already in place have failed to stop a range of quality and safety issues including water ingress, leakage, structural weakness, and non-compliant cladding (CEDA 2022c). Indeed, mandatory registration of builders has been pursued since the 1960s to deal with building defects in Australia (Georgiou, Love and Smith 2000). Yet defects have remained a perennial problem and it remains unclear whether registration has produced benefits — research analysing insurance and pre-purchase inspection data of new homes and apartments in Victoria in the 1980s and 1990s found the number of defects were no different between owner-builders and registered builders (Georgiou, Love and Smith 1999; Mills, Love and Williams 2009).

While these findings should not be generalised to all cases of licensing and registration, they emphasise the importance of establishing the additionality of licensing i.e., the extent to which the introduction of mandatory entry requirements would lift standards beyond that already provided by the market through incentives for businesses to hire and train qualified individuals.

There is a stronger case for regulatory reform where intervention improves product information, processes for accountability and incentives for upskilling. A central concern highlighted by research and industry consultation has been the privatisation of building surveyors that occurred in the early 1990s. Private surveyors now service most of the sector but research and consultation has identified concerns about their independence, poor information sharing (with both consumers and regulators) and a weakened role for government oversight (Senate Economics References Committee 2018; Shergold and Weir 2018; Paton-Cole and Aibinu 2021).

Other issues identified as drivers of poor quality have included:

- poorly defined accountability and process in the design phase
- a lack of accountability during the project and once it has been delivered
- poor certification, data collection and information sharing
- a cultural environment emphasizing low cost/low value work, box ticking, and under investment in skilled labour. (Crommelin et al. 2021).

Some research has found defects are primarily the result of poor workmanship, but this is not necessarily a result of skill levels below a minimum threshold — it is typically linked to issues about accountability, motivation and communication (Johnston and Reid 2019, p. 11). For instance, Love et al. (2009) investigated the cause of errors in construction and engineering projects across Melbourne, Perth and Sydney and found the majority were intentional violations to increase operational efficiency. Some

Box 3.5 – Defects and complaints in the building and construction industry

international research has argued that while human errors are the immediate cause of defects in the building and construction industry, the originating issue lies in organisational practices:

... it would seem that defects are not caused primarily by lack of knowledge in the industry or by lack of education, thereby suggesting that increased efforts in training would not be expected to reduce the incidence of defects ... effort is needed to change procedures in project management, as these are more likely to have greater impact than either further training or changes in routines on the construction site. (Jingmond and Ågren 2015, pp. 213–214)

Research has also highlighted ongoing issues in available skills in the construction industry, but the evidence has been largely focused on skill shortages as opposed to skill gaps^a — where gaps have been identified, it is often because skills have not kept up with changes in technology and increases in the complexity of buildings (PC 2014c; Crommelin et al. 2021; Paton-Cole and Aibinu 2021). Indeed, licensing is likely to exacerbate skill shortages given the evidence that it can reduce the labour supply and create significant barriers for new entrants, migrants and those considering career transitions.

a. A *skill shortage* occurs when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available, and willing to work under existing market conditions. A *skill gap* refers to a situation where employers are hiring workers whom they consider under-skilled or that their existing workforce is under-skilled relative to some desired level (PC 2014c).

The inclusion of licensing reform through further prescription of qualification requirements and continuous professional development appears at odds with the performance-based approach applied to other regulatory reform. Indeed, there is no reason why a performance-based approach to business practices should not extend to the supply of labour inputs. This would involve finding opportunities to reduce reliance on prescriptive licensing arrangements and instead emphasise accountability to standards, access to training and improvements to market information so that business and individuals can make informed workforce decisions.

Research by Crommelin et al. (2021) investigating construction quality and defects found evidence that a lack of accountability and an emphasis on 'box ticking' weakened the incentive for practitioners to pursue higher quality in their work. While licensing may be justified where businesses are poorly placed to meet or determine standards, a performance-based approach would prioritise regulatory arrangements that incentivised high quality work while providing flexibility for businesses to achieve this by pursuing their own workforce solutions and opportunities for skill development.

The evidence on outcomes from licensing

The ability for regulators and policy makers to meaningfully assess the effectiveness of licensing relies on access to quality data and evidence. However, regulatory impact statements on licensing reform suggest regulators are overly reliant on anecdotal evidence and judgement calls on net benefits (box 3.6). While there are practical limits to more and/or better data, many fundamental questions about licensing are not investigated, despite the capacity to do so.

For instance, while it can be difficult to assess trends in safety incidents if they are relatively uncommon; where incidents are observed, it would be valuable to establish whether they were the result of an unqualified and inexperienced practitioner. And where skill gaps are observed, some assessment may be necessary to establish whether formal qualifications would be more appropriate than skills and experience developed on the job — for instance, plumbers appear to be providing some refrigeration and air conditioning services with no evidence of poorer quality or riskier work provided (box 3.3).

Without further evidence it is likely that many lower-level tasks could be performed by people in adjacent occupations without the need for further formal training. There is also an opportunity to better leverage the analytical potential of licensing systems. The extensive collection of practitioners information, compliance and auditing activities could be better designed and drawn upon to guide future licensing policy decisions.

Box 3.6 – Measuring the benefits in regulatory impact statements

Electrical regulation in Victoria

Energy Safe Victoria made changes to electrical safety regulation and electrical licensing over 2019 and 2020. In both Regulatory Impact Statements (RISs) provided, electrical fatality data was used to argue that the benefits in saving 2-3 lives per year (quantified by the statistical value of a life) outweighed the costs of the proposed regulation. In isolation, this may be achievable for each set of regulatory reforms, given that fatalities from electrical accidents have averaged 2.75 a year since 2003-04 in Victoria. However, both assessments used the same data and methods, implying a combined benefit of roughly 50 additional lives saved from electrocution over a 10-year period. Even if one assumes a perfect causal link between electrical regulation and reduced electrical fatalities, this additional benefit is impossible to establish given only 32 fatalities occurred over the decade to 2018-19 and there is no clear trend in annual fatalities over the total 16-year period of available data.

Refrigeration and Air Conditioning licences in Queensland

The RIS provided by the Queensland government on new refrigeration and air conditioning licences (box 3.3) pointed to a range of potential benefits, such as a reduction in safety risks, reduction of competition for licensed businesses, and long-term productivity gains from human capital formation. None of these benefits were quantified, but it was assumed they would be larger than the estimated \$21 million it would cost if *three quarters* of unlicensed workers undertook training to become licensed in RAC and the further \$1 million from licensing fees (DHPW 2019, p. 35).

Building practitioner registration in Victoria

The Department of Environment, Land, Water and Planning conducted a RIS of building practitioner registration in 2017. Through cost-benefit analysis they identified total costs of about \$27 million per year for current regulations. While they acknowledged in theory the potential for competition effects and a reduction in employment and output, a lack of data stopped them from quantifying this effect. Despite further difficulties quantifying benefits from builder registration due to data limitations and acknowledgement that registration requirements would not be the primary instrument to ensure quality in building construction — they nonetheless determined that the regulation was producing a net benefit:

Despite the lack of evidence about the reasons for incidents, and the potential link between these and the specific qualification requirements in the Regulations, the department is satisfied that this break-even point is achievable given the analysis of the extent of the problem detailed above and that this option therefore will result in an overall net benefit. (DELWP, p. 23)



Finding 7.3

Increased licensing is often based on poor evidence of safety risks

Licensing plays an important role in safeguarding standards of quality, particularly for both consumer protection and public health and safety grounds. However, it is not always the case that more stringent licensing is more effective, and in some cases, there is relatively poor evidence that the extent of licensing reduces health and safety risks. Policy advice has repeatedly emphasised proportionate and evidence-based approach to licensing, however this can be difficult to implement where data are lacking.

In the building and construction industry, licensing has been increasingly focused on protecting health and safety despite little evidence of its effectiveness. The lack of empirical evidence supporting licensing design has led to a ramping up of licensing stringency that has increased barriers to entry and is likely leading to considerable inefficiencies in the provision of skills and reduced productivity in the sector.

Priority needs to be given to understanding health and safety outcomes from licensing, including but not limited to:

- the extent that market mechanisms are failing to ensure adequate levels of skill or experience that are necessary to protect health and safety
- the extent that health and safety failings correlate with deficiencies in qualifications, training and experience; as well as qualitative investigation of what drives poor quality work and safety failings
- the additional benefit of licensing where consumer regulation already exists to improve accountability to the quality of outputs (i.e. certification, standards and codes of practice).

3.3 Addressing boundary issues and scope of practice

In occupations where licensing plays a necessary and important role, further challenges relate to designing the scope of occupational licences and the boundaries between different occupations (so-called 'scope of practice' issues). In determining which activities will be covered by a licence, the challenge is to ensure quality and safety in certain types of work without introducing undue barriers.

While occupational licences may have been well designed at their inception, they may require updating to take account of changes in technology, skills and work practices in the occupation.

Efficient boundaries for licences

Designing efficient boundaries in scope of practice involves a trade-off. For instance, if a particular licence is required to perform certain tasks, and the entry requirements are set high, this can ensure that a relatively high level of skill or knowledge is applied to those tasks. However, this also runs the risk of restricting service provision in cases where people with other licences or qualifications could safely provide *some* of the services covered by a licence.

Getting this balance right can be even more challenging when labour market needs differ geographically. For instance, New South Wales previously required car mechanics to hold a general motor vehicle repair licence that covered all types of work. This meant relatively straightforward work, such as wheel alignments, could only be done by a fully qualified mechanic, which added further pressure to regional skill shortages. Recent changes by NSW Fair Trading reformed the licence to include a range of trades certificates for individual classes of work (DFSI 2018). Changes to classes of repair work have also been made in Western Australia (DMIRS 2021a).

Providing a range of licence categories to correspond with specific tasks and skill levels can reduce the barriers to entry created by licensing. But this approach may also disincentivise workers to provide a broader range of services and can add significant administrative costs both for the worker and regulator where additional licences are sought. In Victoria, plumbers must apply for separate classes of licence for Stormwater roof plumbing and sanitary plumbing, which is not the case in other jurisdictions.

Little is known empirically about how this design challenge impacts labour market outcomes between jurisdictions. Either way, maintaining equivalence between regulated tasks and work practices creates an ongoing challenge for policymakers. In Victoria, metal roofing work can only be undertaken by a registered or licensed stormwater roof plumber — builders specialising in roof tiling could be technically capable of undertaking similar tasks but are not authorised to do so. While options to adjust scope of practice for metal roofing were considered by the regulator, a lack of data or evidence on non-compliance among builders completing roofing work stopped substantial reform being pursued (DELWP 2018, p. x).

Scope of practice in health

In the pursuit of high-quality care for all Australians, licensing of healthcare professionals involves a unique trade-off between standards of care and access to care.

- Licensing is highly desirable in pursuing standards of care because consumers have difficulty establishing the quality of medical services before and even after the event, and there are potentially severe consequences of poor services (PC 2008, p. 93). Furthermore, market incentives and signals of quality are a poor alternative to licensing when health services are publicly funded.
- However, unlike safety concerns in the purchase of a new home, protection of public health is also compromised without timely access to care. For instance, regional and remote Australians face barriers to accessible healthcare, in part due to workforce shortages of health professionals. In this way, the barriers to entry remain an important cost associated with extensive licensing of health professionals. This includes the challenges of attracting and recognising international health practitioners (discussed in chapter 2).

Health outcomes should be the primary focus of licensing in health, and to achieve this in the context of constrained supply of skilled labour, health professionals should be practising at their full scope according to their skills and experience. However, in practice, rapid changes to technology, skills and patient needs make it a challenge for regulation to keep pace.

The National Accreditation and Registration Scheme (NRAS) was designed to balance these priorities (box 3.7), but challenges have persisted in coordinated reform and responsiveness to workforce needs (Snowball 2014). Ensuring health professionals can optimally use their skills and knowledge is a perennial issue. In some cases, licensed highly-skilled practitioners have sole responsibility for performing tasks that could safely be delegated to other highly-skilled professionals under a different licence (for instance a nurse practitioner providing diagnosis and prescribing services traditionally done by a GP). This is particularly true in primary health where evidence suggests the most gains can be made by improving the distribution and provision of services, rather than funding a larger supply of medical practitioners (PC 2015a; DoH 2021; Breadon and Romanes 2022).

The COVID-19 pandemic has brought this challenge into sharp focus, with added pressure on regional and remote healthcare access, a sharp rise in GP waiting times indicating supply constraints and changing demand in services towards telehealth, mental health services, complex needs and long-covid. Both in Australia and internationally, the medical response to the pandemic (including vaccine rollouts) demanded flexibility in the workforce, ensuring practitioners were operating at their full capacity.

Past work on the healthcare workforce has identified a range of allied healthcare professionals that could be doing more through expanded scope of practice (PC 2015a). More recently, Grattan has argued for a longer-term plan to restructure the workforce according to a new model of care that prioritises a team based approach (Breadon and Romanes 2022). While larger scale reform may be warranted, more immediate improvements to the accessibility of quality care could be pursued through better utilisation of nurse practitioners and pharmacists.

Box 3.7 – How the NRAS regulates scope of practice

The NRAS was established in 2010 and attempts to strike a balance between flexibility and standards of care in governing scope of practice. The scheme created a national law that would be administered by the Australian Health Practitioner Regulation Agency (AHPRA) but enacted by the states to allow potential variations in regulation. This has ensured a base line of consistency in the regulation of healthcare professionals while providing some flexibility for states — for example mandatory reporting of practitioners in Western Australia and Queensland (Bennett et al. 2018, p. 169).

In setting scope of practice this flexibility also extends to individual health providers. The National Registration and Accreditation Scheme regulates the legal use of occupation titles and broad boundaries for scope (which states have some control to alter in practice), but individual health providers are responsible for setting scope of practice at the organisation and individual level (within the boundaries that AHPRA set) (ACSQHC 2015, p. 5). However, AHPRA and the professional boards retain some control over this process by settings standards of practice and a governance process that providers must follow in managing scope of practice.

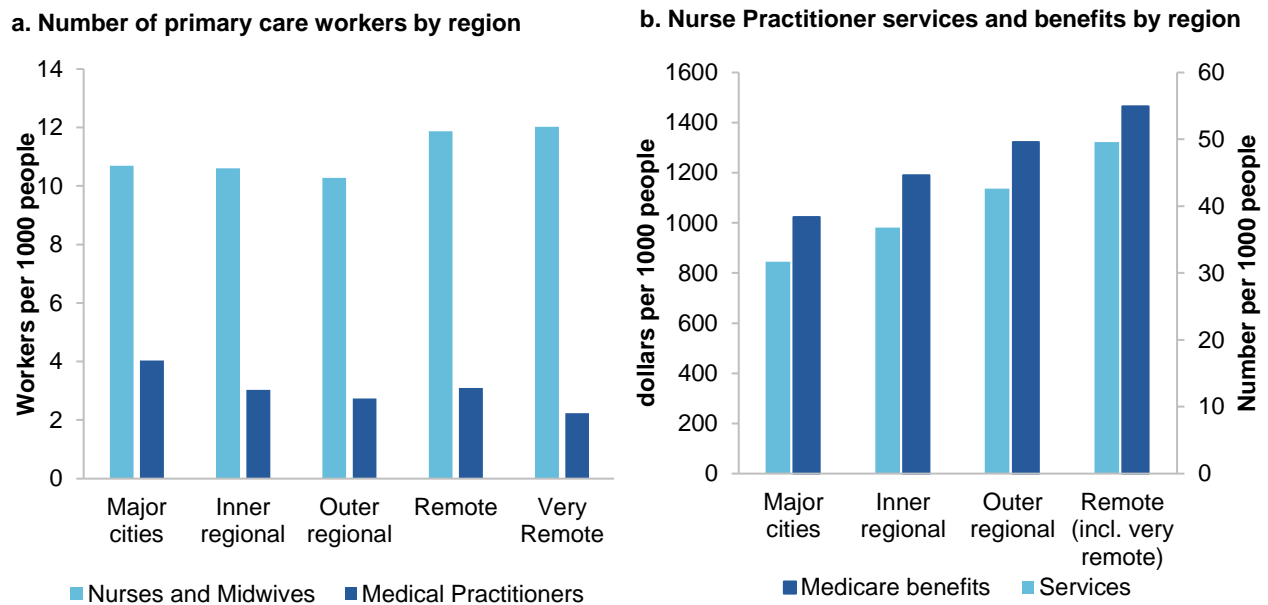
Expanding scope of practice for Nurse Practitioners

Nurses with advanced skills and training are often capable of taking on work traditionally done by medical practitioners and other tasks beyond the scope of a registered nurse. There are many state and organisation level versions of advanced nurse practice, but the Nurse Practitioner (NP) is the only legally protected advanced practice title authorised through the NRAS (Chief Nursing and Midwifery Officers Australia 2020). Endorsement as an NP requires 5000 hours (equivalent to 3 years) full-time experience in advanced nursing practice and completion of a masters with a clinical speciality. The scope of practice extends beyond the Registered Nurse role enabling NPs to conduct advanced health assessments and diagnoses, order and interpret diagnostic tests, prescribe some medications, and refer patients to other health care providers (Smith et al. 2019).

Research internationally and in Australia has investigated the outcomes of NP care and episodes of further scope of practice expansion. Compared with medical doctors, NPs are found to provide similar levels of care or better, with no evidence of poorer health outcomes (Stanik-Hutt et al. 2013; Petek and Thomas 2021). Furthermore, NPs can increase access to care, and reduce overall cost (Jennings et al. 2015; Martin-Misener et al. 2015, Smith 2022).

Beyond substitution for similar work, NPs can also effectively provide primary healthcare in identified service gaps, such as primary care in regional and remote areas, aged care and mental health (Clark et al. 2013; Xue et al. 2016; Alexander and Schnell 2019). Indeed, NPs are well positioned to play a stronger role in the delivery of regional and remote healthcare services given the significant contribution nurses and midwives already provide (figure 3.3). In remote areas of Australia, NPs are often the only health professional available (Department of Health 2021, p. 8)

Figure 3.3 – Nurses, midwives and nurse practitioners play a leading role in regional and remote healthcare^a



a. AIHW analysis of Department of Health, MBS claims data; and ABS, ERP.

Sources: AIHW (2021, 2022).

Despite the considerable benefits documented in NP roles, they remain underutilised in Australia. NPs make up only 0.7% of the registered nursing workforce, with only 1 NP for every 100 doctors (compared with 16 for every 100 doctors in the United States) (Maier et al. 2016; NMBA 2022). This likely reflects the ongoing barriers faced by NPs in properly utilising their skills and broader recognition and acceptance in their role.

While the national law broadly recognises the NP role and its potential to provide advanced services in diagnosis and prescribing, scope of practice remains restricted by two major funding issues:

- the limited number and value of Medicare Benefits Schedule (MBS) and Pharmaceutical Benefits Schedule (PBS) items NPs have access to that reduce the quality and continuity of care NPs can provide
- mandatory collaborative arrangements that require a doctors sign off on an NPs work to access Medicare billing for services.

Limited access to MBS and PBS

Since 2010 NPs have been given access to some MBS and PBS items to conduct consultations and deliver certain prescriptions. Despite this, the limited nature of access continues to be reported as a major barrier to effective primary care.

Although eligibility for the MBS and PBS appears to have enabled the development of privately practicing NP services, research suggests that the current structure of the MBS and PBS does not enable all privately practicing NPs to provide complete episodes of care and there is a challenge in maintaining a viable business model using only the MBS rebate. To overcome this, NPs may privately bill, which can lead to increased costs to consumers choosing to see an NP as their healthcare provider. (Department of Health 2021, p. 10)

In the Medicare benefits schedule review conducted over 2016 to 2020, expansion of NP funding through the MBS was proposed but ultimately rejected predominantly due to 'the lack of clarity regarding nurse practitioner scope of practice' (DOHA 2020, p. 1). It was therefore recommended that Nurse Practitioner's establish a scope

of practice and credentialing framework, potentially guided by the Nurses and Midwifery Board of Australia (NMBA), and investigate alternative funding models outside of the MBS that would be more appropriate.

'Credentialing' is an extra step in verifying the appropriateness of a practitioner beyond registration and endorsement, which establishes clinical privilege to engage in specific advanced practice established through a scope of practice. The Australian Commission on Safety and Quality in Health Care advises that formal credentialing is required where health practitioners are undertaking unsupervised practice, such as doctors, NPs, midwives and allied health professionals (ACSQHC 2015, p. 5). For instance, most states and territories have implemented credentialing frameworks for senior doctors that are particular to their own healthcare context (ACSQHC 2015, pp. 34–35). In some cases credentialing is used to promote quality standards, such as credentialing requirements for GPs to claim MBS services for mental health items (Department of Health 2021).

Quality standards for practicing NPs are regulated by the NMBA professional practice framework, which covers such things as standards for practice, code of conduct and ethics, decision-making framework, safety and quality guidelines, CPD and recency of practice. To the extent that further credentialing guidance is necessary to ensure standards of care are upheld for NPs working autonomously in primary care settings, states and organisations should implement credentialing policy that is suitable to each jurisdiction's context. However, autonomous practice is already undertaken by NPs in private practice settings (albeit with more restricted funding arrangements) and proposed expansion of funding for NPs has largely related to existing services within current scope of practice (Nurse Practitioner Reference Group 2019).

In practice, the NRAS and NMBA define the outer limits of practice, based upon the full competency of an endorsed NP and credentialing is independent of this. As such, it is not clear that the development of credentialing policies should be prerequisite for funding reform for NPs. If it is to be treated as a prerequisite, its progress should be prioritised. To the extent that the expansion of MBS eligibility is held up by the process of developing a national credentialing framework or other governance arrangements, this will delay improvements in patients' access to quality health care.

Mandatory collaborative arrangements

A related issue in the funding constraints imposed on NPs relate to mandatory collaborative arrangements. This refers to the legal requirement that NPs establish a collaborative arrangement with a medical practitioner (MP) or entity that employs MPs, in order to access MBS and PBS.

This arrangement can create inefficient and costly delivery of care where patients must pay out of pocket for simple procedures or wait to be signed off by a medical practitioner to access Medicare rebates. Research on collaborative arrangements has shown they may limit healthcare provision in regional and remote areas, create barriers in continuity of care and impose unnecessary legal requirements where collaboration already occurs (Schadewaldt et al. 2016; Currie, Chiarella and Buckley 2017, p. 538). Mandated collaboration can also exacerbate underutilisation of NP services because unclear legal liability creates perceived risks for medical practitioners to sign off on these arrangements (Ervin et al. 2019; Chiarella, Currie and Wand 2020).

In the United States, NPs in just over half the states in the United States are subject similar mandated supervision or contractual arrangements with a physician. Koch and Petek (2021) analysed many of the recent changes in state law that expanded NPs scope of practice by removing these arrangements and found no evidence that it harmed patients and some limited evidence that it provided health benefits.

The Australian Medical Association stated that if collaborative arrangements were removed:

There is a real risk that a patient's usual doctor can be excluded from decisions about a patient's care or decisions are made in the absence of all necessary information. Where care becomes

fragmented in this way, it increases the risk of poor patient outcomes due to misdiagnosis and missed diagnosis, delayed medical intervention and treatment, and adverse outcomes from the interaction of different medications and treatments. (Australian Medical Association 2021, p. 4)

At the same time, the principle of mandatory collaborative arrangements appears at odds with the original principle of the NRAS. States, organisations and individual practitioners are expected to uphold standards of care, while being entrusted with the flexibility to deliver health services in a manner that is responsive to individual context and capacity. Legally mandating collaboration to enforce continuity of care is inconsistent with this approach and there is little evidence it is having the desired effect of genuinely incentivising teamwork, information sharing and continuity of care.



Recommendation 7.9 **Address known issues in scope of practice**

Australian governments should work with the relevant regulators to re-examine boundary issues relating to occupational licences. In particular, where independent reviews have already highlighted problems or potential gains to service quality, safety, and productivity, governments and regulators should develop plans to implement those changes.

As an example, the Australian Government should work with the Australian Health Practitioner Regulation Agency to expand Medicare Benefits Schedule and Pharmaceutical Benefits Scheme items to nurse practitioner services that currently receive inadequate funding. Consideration should be given to amending requirements for collaborative arrangements and to credentialing policy, given their importance to the employment of Nurse Practitioners.

Expanding scope of practice for pharmacists

In Australia, only 19% (23 million visits) of all GP visits were considered less complex in 2011-2012 (Duckett and Breadon 2013, p. 21). A low complexity case involves only one problem that can be treated with one or two medications and requires no referral or further investigation. Many countries, including Australia, have recognised the opportunities in expanding scope of pharmacists practice to take on some of these cases, with several regulatory options available to expand scope of pharmacy prescribing in a way that balances access and quality of care (box 3.8).

One successful example of this has been the expansion of immunisation services provided by pharmacists. This expansion in scope has allowed community pharmacies — in addition to GPs — to begin administering vaccines over the last decade. From 2017 to 2019, the initial period in which pharmacy prescribing was introduced nationwide, pharmacy vaccinations grew from 0.1% of all vaccinations reported to 2.7%. The rate of pharmacy vaccinations has been highest for older Australians and those living in regional areas (Vette et al. 2020).

Box 3.8 – Expanding prescribing rights for pharmacists

Currently, pharmacists are trained and authorised to diagnose common medical conditions and supply low-risk medications for pharmacy only (schedule 2) and pharmacist only (schedule 3) medications. Expansion of pharmacist prescribing rights can occur where states authorise restricted access to prescription only medicines (schedule 4).

The Pharmacy Board of Australia has identified three models of non-medical prescribing that the Australian, state and territory governments can pursue to expand prescribing practice for pharmacists:

- prescribing via a structured prescribing arrangement (sometimes described as prescribing according to a protocol)
- prescribing under supervision (within a documented collaborative arrangement for example, between a pharmacist and the patient's GP)
- autonomous prescribing.

States and territories have adopted pharmacist vaccination via structured arrangements. This involved amendment to various state medicine and poison legislation to authorise limited prescription of certain medicines according to a protocol (following training and procedures set out in policy).

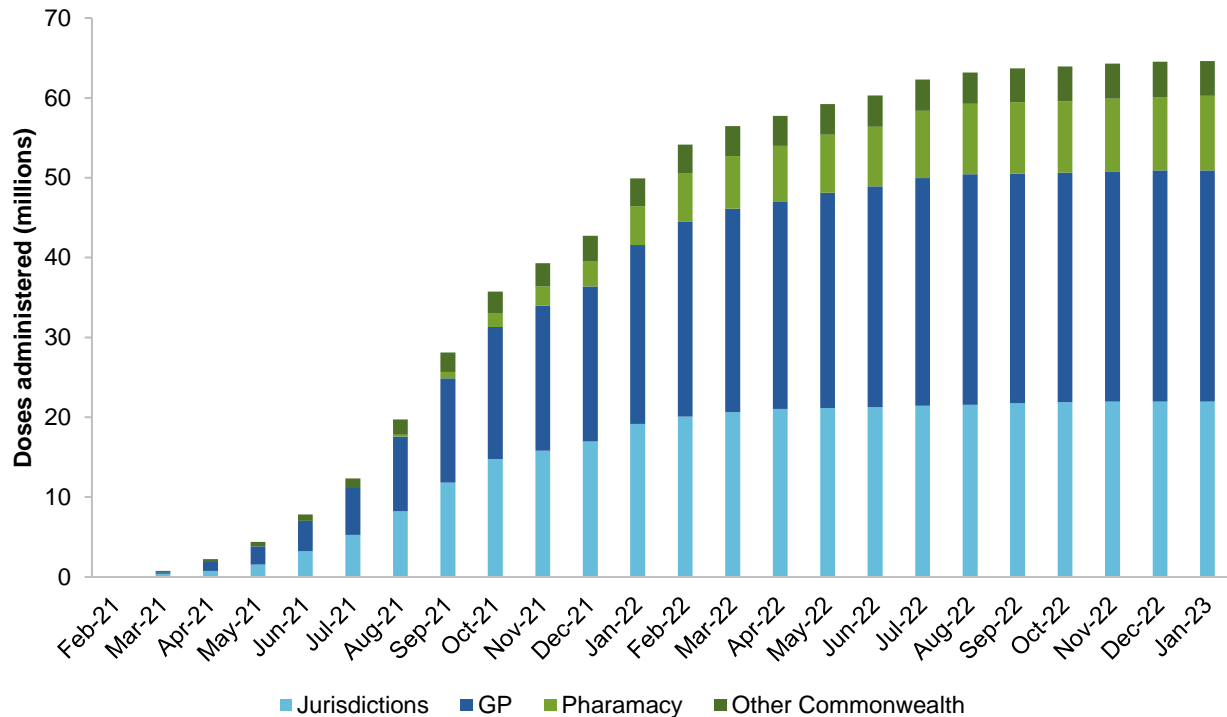
The detail of these amendments has varied in each jurisdiction according to the vaccinations permitted, age requirements, reporting and information sharing requirements, registration requirements for pharmacies and pharmacists and availability of funding through the National Immunisation Program. All states and territories provide some form of vaccination access through pharmacies for influenza, tetanus and measles, while access to vaccinations for other conditions, such as HPV and Hepatitis, is only provided in some jurisdictions.

While states and territories can pursue their own scope of practice reforms via structured or collaborative arrangements, autonomous prescribing would require registration and endorsement via changes to the national law. Before this change in national law could occur, the Pharmacy Board of Australia would need to develop accreditation standards for pharmacist prescribing education programs. The Pharmacy Board of Australia has indicated they will develop accreditation standards for completion by 2023 to support any future efforts at autonomous prescribing by states and territories — if current trials of pharmacy prescribing prove to be safe and effective.

Sources: Pharmacy Board (2022); NCIRS (2022).

This has also enabled the inclusion of pharmacy vaccination in the COVID-19 vaccine national rollout strategy and its implementation was subsequently brought forward to assist with roll-out in regional and remote areas (Morrison 2022). As of January 2023, pharmacy providers have accounted for 14% of total COVID-19 vaccine doses administered since the pandemic began (figure 3.4) (DHAC 2023).

Figure 3.4 – Pharmacy vaccinations played a substantial role during COVID-19
Cumulative doses administered by channel



a. Data from the Australian Immunisation Register, as at 18 January 2023.

Source: Department of Health and Aged Care (2023).

Trialling pharmacy prescribing for low-risk conditions

With the successful expansion of pharmacy-administered vaccination, trials have begun in some states for prescribing medicines for low-risk emergency and repeat prescriptions. This began with Queensland trialling community pharmacy management of urinary tract infections (UTIs). Evaluation of the program found both patients and pharmacists reported significant value from the service because of improved accessibility and convenience. There were no indications that quality of care had been compromised and pharmacists were found to comply with treatment protocols (Nissen, Lau and Spinks 2022).

While these results are promising, more trialling and empirical investigation will be needed before generalised conclusions can be made to guide future policy. Some issues in the collection of data were also noteworthy and should be rectified in future trials.³³

Further reform and trialling of expanded scope of practice for pharmacists will soon commence in Queensland and New South Wales (and potentially in Victoria), with the aim of expanding the types of vaccines a pharmacist can administer and prescribe for many low-risk conditions. In North Queensland, trialling will also expand scope to include the provision of health and wellbeing services and prescribing medicines as part of chronic disease management programs (Queensland Health 2022).

³³ Outcomes for more than 4000 of those who participated in the trial were not followed up, with the reason for the failure to follow up unknown in almost two thirds of cases. Effort was made to prompt pharmacist to follow up patients, but it remains possible that a lack of reporting and ineffective or inappropriate treatment could be correlated and bias the results. Future reporting should ensure data collection methods are independent of trial subjects.

The North Queensland trial has faced some challenges with disagreement over the safety and integrity of the trial amongst major stakeholders, including peak medical bodies that represent doctors and pharmacists respectively (Toomey, Burns and King 2022). These disagreements should not be used to scuttle further experimentation with reform, but rather they highlight the importance of constructing well-designed trials that produce an evidence base for rigorous, independent evaluation of the outcomes.

Funding coverage through MBS and PBS should also be considered, given access to affordable healthcare is a primary motivation for the trials. At the time of writing, the proposed trials in North Queensland will not be eligible for PBS and MBS coverage, requiring patients to cover the costs out-of-pocket (Queensland Health 2022). However, despite out-of-pocket fees charged in the Queensland UTI trial, participants reported high levels of satisfaction in the service attributable to convenience, and pharmacists reported that UTI services were predominantly provided on weekdays and during working hours (Nissen, Lau and Spinks 2022, p. 50). In this instance, differences in service cost were likely offset by the relative cost saving to the individual from convenience in the access to UTI services that would not have been possible through a GP appointment booking.

It is uncertain whether the cost saving from convenience would outweigh fees for more expensive services that are being proposed in Queensland and New South Wales. Furthermore, cost saving from convenience should not be prioritised if the aim is to improve access to healthcare — either for disadvantaged groups, or in areas where other services are unavailable. Funding arrangements under MBS and PBS should follow consistent principles regardless of the practitioners delivering subsidised services.

Will pharmacy-based prescription lead to over-medication?

Two key concerns have been raised about pharmacy-based prescription. First, there is a question of how well prepared pharmacists might be to take on the additional task of prescription. If changes to scope of practice are to improve access to quality care, it would have to involve an adequate standard of diagnosis, prescribing, and deprescribing. As such, it seems appropriate that recent trials focused on low-risk and repeat prescriptions and included sufficient safeguards and additional training.

Second, there is a potential for conflict-of-interest in community pharmacies, because funding primarily comes through medication mark-ups and dispensing fees (Duckett and Breadon 2013, p. 29). There are concerns this could produce moral hazard through the financial incentive to over medicate, which could also exacerbate current issues in antibacterial resistance (Nissen et al 2010, p. 31).

International evidence does not support this view, with research largely showing prescribing pharmacists in a range of settings provide comparable healthcare outcomes to usual medical prescribers (Weeks et al. 2016). Furthermore, some evidence suggests prescribing pharmacists can play a role in the withdrawal of inappropriate medication (Bužančić et al. 2022). In Canada, a trial of pharmacist prescription for UTI medication found pharmacists were consistent with guidelines and also optimised antibacterial therapy prescribed by a physician that was found to be inconsistent with guidelines (Beahm, Smyth and Tsuyuki 2021).

In Australia, antimicrobial resistance has emerged despite prescribing arrangements largely restricted to medical practitioners. While policy must not accelerate this trend, Australia's national strategy in combatting antimicrobial resistance has identified pharmacists as key players in antimicrobial stewardship interventions and community pharmacists have been identified as important educators on appropriate use of antimicrobials (ACSQHC 2018, p. 257). If properly implemented, stronger involvement of pharmacists in prescribing could create opportunities to develop better prescribing behaviours in healthcare.

Developing prescribing models that are appropriate to the practice setting will also reduce the risk of over-prescribing. For instance, it may be more appropriate to implement structured arrangements in community pharmacies and autonomous prescribing in larger hospitals where a pharmacist's scope of practice would be defined by the guidelines and practices of the hospital (Duckett 2019). Either way, where

independent prescribing is pursued, typical protections through standards, codes of conduct and credentialing will be essential. Ensuring there is a separation between prescribing and the supply of medicine will also be necessary to manage conflicts of interest (Pharmacy Board of Australia 2019). Because independent prescribing is a relatively new development in many countries, it will be important to prioritise data collection and evaluation of prescribing behaviour — particularly in the monitoring of over-prescription relative to current medical practitioner levels.



Recommendation 7.10 **Pursue trials into expanded scope of practice**

State and Territory Governments should undertake trials for expanded scope of practice in health services where supported by evidence. Where service funding is determined by an intergovernmental agreement (between state and federal levels) the Australian Government should allow the appropriate funding arrangements to encourage the use of evidence-based trials.

As an example, State and Territory Governments should undertake similar trials as those run in New South Wales and Queensland with regard to the prescription scope of pharmacists' providing vaccinations and low-risk medications. The Australian Government should ensure that the novel arrangements that are the subject of these trials are given equivalent funding through the Medicare Benefits Schedule or the Pharmaceutical Benefits Scheme, where the benefits are substantiated.

3.4 Laying the foundations for better occupational licensing design

The 2018 Senate inquiry into occupational licensing in Australia found that the current state and territory led licensing system in Australia remains complex, duplicative, inconsistent and burdensome (Senate Red Tape Committee 2018, p. 17). Without clear evidence on the benefits of licensing in Australia, this is likely causing needless restriction to skills and reductions in productivity.

The Senate Committee acknowledged that a previous attempt at a national licensing system had failed because of concerns regarding the complexity and costs of the reform (PC 2015b, p. 35). Nevertheless, they recommended a renewed approach to reform amongst states and territories, with a focus on measurable outcomes (rather than the mechanism of achievement); the identification of best practice models for occupations; research into the health and safety benefits of occupational licensing; and expansion of automatic mutual recognition (Senate Red Tape Committee 2018, p. 18).

Since then, states and territories has successfully implemented automatic mutual recognition with the aim of improving interstate mobility. Other reforms recommended by the Senate Committee that would improve licensing schemes within jurisdictions have not been pursued. Prioritising these reforms has the potential to substantially improve productivity in services (section 3.1), but this will require a concrete plan for reform with clearer responsibilities between the Australian, state and territory governments, as well as better investment in data collection and a research agenda to build the evidence base on licensing outcomes.

A better approach to licensing reform

Implementing licensing reform is more complex when it involves multiple agencies. While it has been recommended that licensing reform be conducted by an independent body rather than the regulator to ensure no conflict of interest (PC 2011b) — in practice this has proved difficult. Previous work has found nearly 80% of occupation-registration authorities engage in regulation review (PC 2015b, p. 269).

Part of the challenge is appropriate resourcing and review scope. For instance, assessment of alternative consumer regulation to licensing would often involve consideration of policy changes outside the legislation a licensing agency is responsible for. Streamlining licensing arrangements into a central consumer service agency is one way states and territories can achieve better utilisation of resources and broader focus on licensing policy, but this is not always possible depending upon legislative requirements underpinning licensing schemes.

Industry-focused reform can also be useful. In building and construction for instance, national coordination exists through the Australian Building Codes Board and Building Ministers Meeting, which provides research and regulatory guidance. Recent efforts to improve compliance with the National Construction Code consistently across jurisdictions have been successful (DISR 2019). Despite this, assessment of licensing arrangements could have benefitted from broader guidance on best practice models and data on current licensing outcomes to clarify the role it plays in conjunction with other forms of regulation.

States and territories will need to prioritise broader reform agendas — this could usefully be supported by clearer responsibilities for licensing reform between the different levels of government and a stronger supporting role played by the Australian Government. One possibility would be to designate a central body that would be responsible for broader oversight and a national reform agenda. This body would not be responsible for implementing a nationally mandated scheme, but rather provide support and guidance on best practice to licensing and work towards national consistency where it is feasible. This body would also be responsible for developing a central database and research agenda on licensing in Australia (discussed below).

In the 25 years since the National Competition Policy review, the service economy has evolved rapidly — digital technologies provide new sources of market information and new products are changing the nature of health and safety risks. A renewed national effort at licensing reform will be needed to meet these challenges. The OECD argued that in light of these changes, consumer regulation should shift its focus from regulating inputs (e.g. entry requirements through licensing) to regulating outputs (e.g. negative licensing, certification, etc), because transaction costs have been reduced and information about quality is more accessible to consumers (Bambalaite, Nicoletti and von Rueden 2020, p. 12).

Exploring these options will require coordination among states and territories to consider the appropriateness of licensing arrangements and alternatives that may be available. There is a need to build a better foundation of evidence and cohesive policy advice to define what the limiting principles of licensing are and promote greater regulatory experimentation and evidence gathering where uncertainty remains. Laying this foundation will help to ensure that consumer protection regulation remains effective in the future while promoting productivity.



Recommendation 7.11

Improved process for regular review of licensing policy

Australian governments should conduct regular, independent review of occupational licensing systems in their jurisdictions, aiming to improve efficiency without compromising safety outcomes, considering efficient scope of practice as well as the optimal mix of licensing and other forms of safety regulation. Individual jurisdictions should drive the process, sharing the findings and conclusions publicly such that other jurisdictions may benefit. In some cases, the process of review and reform could usefully be driven by the coordinated efforts of all Australian governments, including through regular meetings at the ministerial level.

Digital licensing and data collection

Digital licensing provides opportunities to reduce administrative burden for business and individuals while improving information asymmetries faced by consumers. It can also lay the foundation for a national licensing database and potential for further matching across other administrative data sources. This would improve data sharing for mutual recognition arrangements, current compliance activity, and analytics to both monitor trends in licensing and assess the effectiveness of reform. Stronger emphasis on monitoring (i.e. collecting and publishing data) and evaluation would go a long way to produce a better understanding of the costs and benefits of licensing schemes.

New South Wales, Victoria and South Australia have implemented digital solutions for some occupations and similar plans are underway in Western Australia (DMIRS 2021b). If these separate digital platforms were to eventually integrate — either through shared IT resources or API connections — this would create the opportunity for a ‘single practitioner view’ across jurisdictions (discussed below).

A national approach to digital licensing does not necessarily require the immediate pursuit of a single, unified platform across states and territories. This would be costly given the complexity of the regulatory environment and diverse IT solutions underpinning it — in New South Wales alone, 90 agencies were identified in an IPART survey as agencies that administer licences (IPART NSW 2014, p. 29).³⁴ Even where agencies share a licensing function, considerable variation can exist in the policy area and functions of the agency. However, there would be substantial benefits to improving information sharing across governments and businesses, and establishing a better repository of data on licensing to inform policy decisions. States and territories should coordinate to ensure digital licensing systems have future integration in mind.

The administrative challenges of automatic mutual recognition (AMR) provide one example where a coordinated digital solution has been beneficial. Poor information sharing systems have been one reason why many occupations have been exempted from AMR, as the lack of immediate information on a practitioner has been seen as too risky for some regulators. For instance, teachers are currently exempt from AMR across all states and territories due to concern that teachers found to pose a safety risk to children in one jurisdiction could move interstate and begin teaching in another jurisdiction before employers or regulators are aware. This has necessitated greater coordination between states on a shared IT solution to ensure information sharing of cross border practitioners is tracked and notifications are timely. This work presents an opportunity to go further and establish a coordinated data sharing system that captures all information on a licensed practitioner, not just notifications for AMR purposes.

³⁴ This includes all licence types, not only occupational licences.

Single Practitioner View

Digital licensing can play a role in government initiatives aiming to create a single digital identity by extending a consistent national digital ID to registration and licensing schemes. This would help integrate and streamline information that a licensee must provide to regulators and provide accessible and better quality information for consumers about licensed workers. For instance, Services NSW has developed a licensing platform that brings together a range of licences across health, security, trades, real estate and gaming sectors. This can give practitioners the ability to update and manage their licences digitally, while potential consumers can use the platform to access an up-to-date snapshot of the practitioner's licences, qualifications, insurance, and compliance track record (figure 3.5).

The NSW licensing platform also demonstrates it is possible to consolidate data from various agencies and legislative arrangements. The platform currently brings together licences administered through NSW Fair Trading (responsible for the majority of occupational licences in NSW) and other agencies such as surveying licences through the registrar of the Board of surveying and spatial information and security licences through the Commissioner of Police.


A single practitioner view can provide an opportunity to consolidate several background checks that are undertaken and improve the administrative effectiveness of regulators compliance and enforcement capabilities. Currently, there is considerable overlap between national police checks, working with children checks and character checks performed by licensing agencies. Consolidating these character checks through digital integration can improve efficiency in the management of licensing systems and reduce the administrative burden on licensees (box 3.9). These challenges have been seen in the administering of Working With Children Checks (WWCC), with a report into the functioning of WWCC noting the administrative efficiency gains of integrating with the national police database:

[Current WWCC] arrangements do not currently enable agencies to access cardholders' national criminal records, meaning that continuous monitoring is restricted to records arising in the jurisdiction that issued the WWCC. The practical effect of this is that a cardholder could commit an offence in another jurisdiction that remains undetected until their WWCC is due for renewal, which, if known, would result in the cancellation of their WWCC.

Many submissions on Issues Paper No 1 noted that WWCC renewals are needed at regular intervals until continuous monitoring is expanded to include national criminal records, so that new relevant records are identified and assessed. For example, Victoria reported that, since their WWCC scheme commenced in 2006, approximately 54% of all negative notices were issued to existing cardholders, demonstrating the value of this type of monitoring. (Royal Commission 2015, p. 108)


Figure 3.5 – New South Wales' digital licence platform

A snapshot of publicly available information on licensed practitioners



✔ **Current**

Licence Contractor **Expiry** 22 Oct 2023

Number 51454682 **Address** 

^ **Licence, Classes and Conditions**

Contractor Licence

∨ [Condition \(1\)](#)

Classes (2)

Class	Effective	Date
Carpenter	Effective	23 Oct 2017
No conditions		
Kitchen Bathroom Laundry Renovator	Effective	14 Apr 2021
No conditions		

∨ **About**

∨ **Insurance**


^ **Compliance**

Passed

Type	Result
Cancellation	✔
Compensation Fund Claim	✔
Disciplinary Action	✔
Penalty Notice	✔
Prosecution	✔
Public Warning	✔
Suspension	✔
Tribunal Order	✔

^ **Timeline**

[Download full history](#)

- 14 Apr 2021 ● **Class Approved**
Kitchen Bathroom Laundry Renovator
- 14 Apr 2021 ● **Licence Condition Applied**
Only for contracts not requiring insurance under the home building compensation fund.
[Show less](#)
- 21 Oct 2020 ● **Licence Renewed**
3 Years
- 23 Oct 2017 ● **Class Approved**
Carpenter
- 23 Oct 2017 ● **Associated Role Added**
Licensee

- 23 Oct 2017 ● **Licence Issued**
3 Years

For more information, contact:

NSW Fair Trading
[Construction and Tradesperson](#)

If this is your licence, update and manage your licence with [Service NSW](#)

[Helpful links for you](#)

Source: Service NSW (2023).

Box 3.9 – Character checks for electrical licences in Western Australia

The Department of Mines, Industry Regulation and Safety (DMIRS) has proposed reform to electrical licences that would enable fitness and propriety checks to be required for licence renewal in addition to checks that are done at the initial granting of an electrical licence.

The proposed change is motivated by concerns that an individual's recent behaviours are unknown to the licensing authority that would disqualify them on character grounds. The DMIRS highlighted an incident in which a licensed individual committed a serious criminal offence for which they were later convicted while performing electrical work in someone's home. The Director of Energy Safety was only made aware of this when the individual applied for a separate licence through another licensing authority, who performed an updated character check and subsequently alerted the Director of Energy Safety. Had the individual not applied for the additional licence they would have remained licensed and able to practice as an electrician.

Even if the proposed change was implemented, electrical licences are typically renewed every five years, meaning it would still be possible for a person to commit a serious criminal offence and continue to practice for several years before renewal is required.

This proposal would add to administrative costs on the agency, while removing the incentive for DMIRS to pursue streamlining of licences in the future. Indeed, under this mechanism there would be rationale for shortening the renewal period to ensure more up to date monitoring of licence holders. The reforms also considered eventually replacing statutory declarations with a national police certificate for fitness and propriety checks, which would add about \$0.8 million in annual costs to licence holders.

Source: DMIRS (2022a).

The Australian Government has since established a national database for WWCC through the Australian Criminal Intelligence Commission that will allow states and territories to integrate their own systems and access continuous national records on WWCC holders (Australian Government 2022a, p. 177)

States and territories should work towards implementing a similar national solution for licensing and registration. This will require states and territories to coordinate when implementing or expanding their digital platforms, including by pursuing:

- technology neutral options for information sharing
- standardisation of licensing concepts and related data items across jurisdictions
- alignment of strategies and frameworks on cyber security, data sharing, and other data management practices
- investigating options to link licensing systems with WWCC and national police check systems.

The creation of an easily accessible and verified view of a practitioner's background and competency represents a significant improvement in market information. States and territories will need to reassess the rationale for licensing where information asymmetry may be better alleviated through improvements to consumer choice facilitated through digital licensing platforms.

Enabling a better evidence base

The increasing adoption of digital platforms also provides an opportunity to improve data collection on licensing and allow researchers and policy makers to fill the considerable gaps in knowledge that exist on the impacts of occupational licensing in Australia. Many of the costs and benefits of licensing have remained theoretical and

impossible to quantify with the available data (section 3.2), and scepticism exists in utilising any international research on the impacts of licensing (Senate Red Tape Committee 2018). The OECD has argued better data collection is a critical next step for Australian policy makers to pursue meaningful reform of occupational licensing — for instance through inclusion of licensing questions in the ABS Labour Force survey (OECD 2021, p. 51). In the United States, the pace of licensing reform has increased significantly since 2015, in part due to the availability of data and growing empirical evidence on licensing outcomes (Thornton, Timmons and Kukaev 2021). Australian research is needed to begin understanding the true costs of licensing schemes in Australia and enable policy makers to clarify the value in pursuing more ambitious reform.

The lack of data in Australia is a considerable barrier for regular review and assessment of licensing policy because each new initiative must either conduct a new survey or rely on a previous survey's data that is likely out of date and narrow in scope. Agencies conducting reform of individual licences in Australia rely on limited administrative and compliance data that is not fit for purpose — leading to judgement calls on the net benefit of licensing not backed by evidence (box 3.6).

In the United States, previous research had relied on an imputation strategy that would infer licence attainment based upon occupational affiliation and the state they worked in. The inability to directly measure licensure and certification was seen as a major barrier to empirical work and estimates using the imputation strategy were found to be biased (Gittleman, Klee and Kleiner 2018, p. 65). This began to change with the introduction of licensing and certification questions in the Survey of Income and Program Participation in 2008 and annual data from the bureau of labour statistics from 2015. Since then, the volume of research on licensing impacts has grown, with numerous studies conducted using this data to measure the labour market impacts of licensing in the United States (Bambalaité, Nicoletti and von Rueden 2020). The recent availability of administrative data has allowed integration with longitudinal business data, providing further accuracy to estimates and a more detailed picture of licensed workers and the businesses hiring them (Zapletal 2019). Researchers have also been able to combine this data with digital product and service platforms to provide insights into the quality impacts of licensing (Farronato et al. 2020).

If states and territories pursue integrated, standardised and technology neutral digital licensing (see previous section), high-quality administrative data could be made available for researchers and policy makers to utilise. Access to this data would also enable the ABS to link administrative data into integrated datasets³⁵ to provide a more complete picture on licensed workers. This data asset could be used to investigate the distributional impact of licensing on wages, impacts on firms by size and competition effects through changes in entry and exit rates.

Detailed administrative data would also create opportunities to explore the potential benefits of licensing. This would require states and territories to investigate other administrative data sources that could be used for analytical purposes or current data collection that could be improved. In building and construction, many Australian agencies are already tasked with collecting data on the quality of outputs, such as compliance, dispute and incidence data. Reform should focus on improving the analytical value of this data because it typically does not provide regulators with enough detail to understand the links between licensing design and outcomes. Furthermore, integration of this data into a national database would give policy makers a detailed view on the links between licensing arrangements, labour market outcomes and worker outputs. For example, it could provide a detailed view on the employment, wage and compliance impacts of mandatory CPD in building and construction trades that is currently being implemented across jurisdictions.

Current policy variation across states and territories could become a strength if utilised for research — for instance, different licensing requirements for a car repair mechanic could be used to investigate the

³⁵ For instance Business Longitudinal Analysis Data Environment (BLADE) and Multi-Agency Data Integration Project (MADIP).

incidence of road deaths related to mechanical failures; different levels and classes of licensed work in many trade occupations could be compared with labour market outcomes and compliance across jurisdictions; and differing thresholds for building licences and insurance requirements could be compared with defects and disputes. Laying the groundwork for more rigorous assessment of licensing design choices would reduce inefficiencies and have positive long-term impacts on productivity.



Recommendation 7.12

Digital licensing designed to enable future data sharing and analytics

State and Territory Governments should continue to develop digital licensing platforms, prioritising choices in technology and design to enable future integration, information sharing and analytics.

4. Effective workplace relations

Key points

- * **The workplace relations system has a fundamental role in driving productivity and wages, but needs repair to achieve those outcomes, including a greater emphasis on co-operation between parties.**
- * **The award system has grown in significance as enterprise bargaining has shrunk, but needs to become more efficient and flexible, in part because they set a floor on conditions in enterprise agreements.**
 - The modern awards objective should be simplified and, with the minimum wages objective, be the test used to judge award variations, which should be able to occur for all aspects of awards at any time.
 - An award review process that concentrated on material defects — including in the wage relativities of the hundreds of minimum wages — would be fairer and more efficient than the current more restricted criteria used by the Fair Work Commission to vary awards.
 - Award regulatory technology ('regtech') and education initiatives — such as tailored advice for small businesses on award compliance — can help businesses better navigate awards.
 - The Fair Work Commission should increasingly look at introducing menu options into awards that give employers choices about how to be compliant with the modern awards objective rather than specifying inflexible single options.
- * **Enterprise bargaining needs reform to provide the mutual benefits and productivity gains that were its original intent.**
 - Effective bargaining can be as much about the culture of a business as the law and is influenced by the willingness of employer and employee peak bodies to co-operate for changes that promote a resilient economy and productivity — as evidenced briefly by co-operation during the early stages of the pandemic.
 - While the 2022 Amendments to the Fair Work Act reduced some flaws in the Better of Overall test, it could be further improved by requiring that the Fair Work Commission approves an agreement if it passes a rigorous set of tests that leave most workers better off even if some are adversely affected.
 - Agreements may sometimes include conditions that limit the efficient management of a business. While it is difficult to anticipate and prohibit all the conditions that may do this, where a problem emerges, the Fair Work Act should be amended to limit the effect of such conditions.
 - In that respect, consultation clauses in some agreements are blocking initiatives to improve the productivity and efficiency of businesses. Allowing the model consultation term in awards to have legal effect over more stringent terms would resolve this. This would not prevent parties from negotiating alternative mutually beneficial alternatives, nor stifle employers' obligations to consult with employees about workplace changes.
- * **The revamped multi-enterprise bargaining streams may assist parties that have been left out of the single-enterprise bargaining system, but whether it succeeds in that objective, and its potential impacts on flexibility and productivity should be a focus of the scheduled review.**

4.1 An evolving workplace relations environment

The design of Australia's workplace relations (WR) system has wide-ranging impacts on co-operation between bargaining parties, wage determination and business decision making and costs — which in turn can affect productivity.

Our assessment of the WR system is against a background of significant change over the past decade and therefore narrower in its focus than the comprehensive inquiry into the system undertaken by the Productivity Commission in 2015 (PC 2015c). A greater reliance on awards has increased the need for an effective award determination process (section 4.2). There is a need for reforms to support enterprise bargaining, which is the form of arrangement seen as most suited to productivity and associated real wage growth (section 4.3). This is especially against the background of recent amendments to the *Fair Work Act 2009* (Cth) (FW Act) to expand the options for multi-enterprise agreements. Meanwhile, the gig economy has grown rapidly, challenging the distinction between employees and contractors (creating policy conundrums that are addressed in chapter 5).

At some level, what constitutes desirable labour market outcomes from a workplace relations perspective is uncontroversial. Labour markets function well when people can find work, acquire skills, and move jobs with relative ease; where employers can hire the workers they need, and skills are put to their most productive use (both within firms and across industries); where greater contributions to productivity are rewarded via better pay and conditions; and when there are adequate worker protections, recognising that labour is a unique input subject to ethical and community norms (PC 2015c, p. 2, 2017a, p. 85).

However, there are diverging views about how the WR system should best contribute to these outcomes. In part, this reflects that judgments about fairness are subjective, and that bargaining can involve compromises between competing demands. It may also reflect the inevitable trade-offs of regulatory design — attempts to encourage efficient and fair bargaining outcomes and deterring potential misconduct by parties can have unintended consequences, incidental effects on compliance cost, and place excessive demands on regulatory resources.

While adversarial workplace disputes can sometimes arise, this masks the fact that **employees and employers generally have strongly aligned incentives to improve productivity** because this can increase both profits and wages. An important role of the WR system is to ensure that productivity opportunities are not destroyed by poor incentives, conflict, unnecessary complexity and high compliance burdens.

The long and changing list of factors determining outcomes from workplace regulation (box 4.1), is a major challenge for policymakers. The generic law must be sufficiently flexible that it can address most of the workplace issues that arise in quite different contexts. While bargaining may often proceed without problems, at other times, bargaining agents have used excessive power to attempt to game bargaining arrangements or have engaged in some form of misconduct. There may be grounds for some carveouts from the generic law when high thresholds have been met (as in the maritime industry),³⁶ but in general, a bespoke set of regulations adapted to each specific context would be unworkably complex.

³⁶ Discussed in the Productivity Commission's (2022d) inquiry report on *Lifting productivity at Australia's container ports*.

Box 4.1 – The effects of workplace relations regulation are highly context-dependent

The balance of bargaining power, the impact of workplace relations on productivity, and the nature of firm and union conduct varies according to:

- economic conditions (which determine both commercial opportunities and skill shortages) will vary over time (for instance, as consumer preferences change) and at any given point in time, will differ between industries and geographic regions
- the role of labour in production processes, which has evolved as Australia shifted to a services-centric economy and will continue to change as technology progresses. Three aspects of the services sector particularly influence workplace relations — it tends to be less capital intensive, has a greater share of lower-skilled workers, and governments regulate and often fund them (as in education, aged and disability care, the public service, emergency services, and much of healthcare)
- broad trends that influence labour supply, such as the supply of particular skills (via education, training, and migration), population growth and ageing, and participation
- factors that affect individual workers, such as search costs, impediments to participation and mobility, and thin markets (such as in regional and remote areas)
- union density (the share of employees in unions) remains high in some sectors, but overall reached a record low of 12.5% in 2022 (ABS 2022f)
- technological change and its potential to displace labour — both terms of hours of labour at the margin, and changes to job descriptions and requirements.

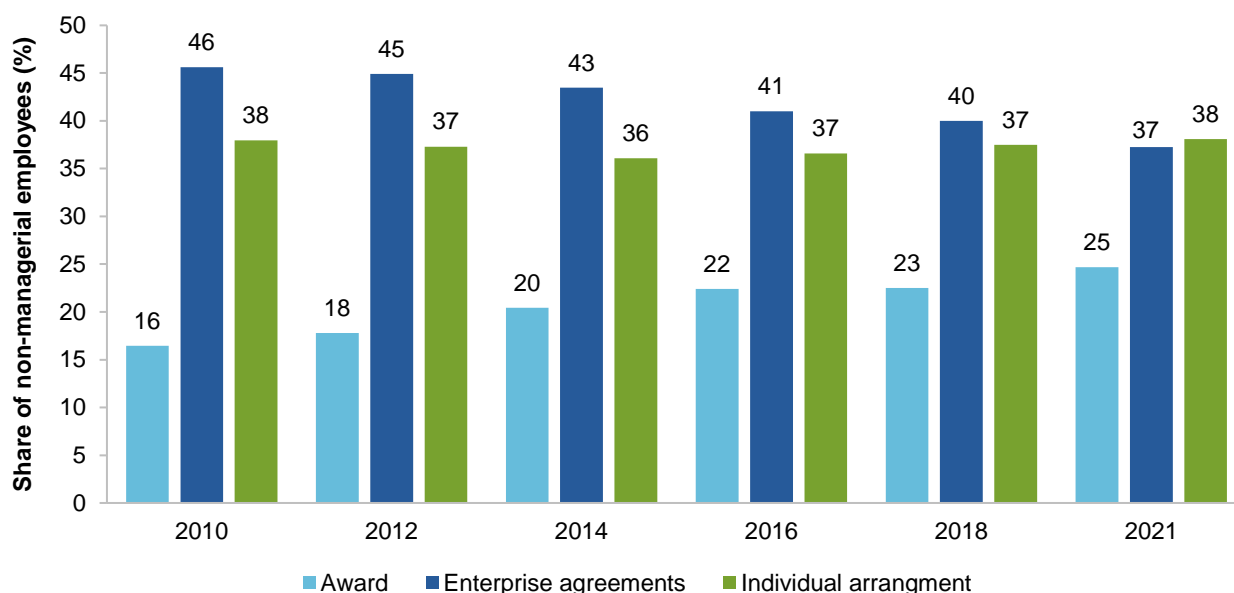
4.2 Awards are growing in policy significance

While only a minority of employees rely solely on awards to determine their wages and conditions, awards have grown in significance (figure 4.1). This has principally been driven by the waning attractiveness of enterprise bargaining, particularly for businesses with lower paid workers, such as health care and social assistance (for example, including aged care workers), administration and support services, and accommodation and food services.³⁷ Remarkably, the number of non-managerial employees on collective agreements barely changed in between 2010 and 2021, while the number reliant on awards grew by nearly 100%. The number of non-managerial employees on individual agreements has grown by 30%, maintaining their parity as a share of employment arrangements. Such agreements are a source of significant flexibility as they allow employees and employers to negotiate different wages and conditions so long as these exceed the award.³⁸

³⁷ Although the share of people whose wages and conditions are solely determined by awards has risen in the past decade, these numbers still represent a much lower share of award reliance than historical experiences. During the middle of the 20th century and prior to the introduction of enterprise bargaining, awards directly set wages and conditions for more than 90% of employees (Mitchell 1998).

³⁸ Some individual arrangements include individual flexibility agreements, which offer more flexibility, and these are also used by some employees in businesses covered by enterprise agreements.

Figure 4.1 – Awards have grown in importance for non-managerial employees 2010–2021



Source: ABS (*Employee Earnings and Hours, Australia*, various issues, Cat. no. 6306.0).

The change in the latter industry partly reflects that some large employers returned to the award after the Fair Work Commission (FWC) terminated their enterprise agreements (EAs), such as in the case of McDonalds (a Fair Work era agreement) and Nandos (a pre-Fair Work era agreement). In 2018, 24% of accommodation and food services employees in large businesses (more than 100 employees) had their pay determined by an award, increasing to 54% in 2021. In the same timeframe, the share having pay determined by an EA declined from 65% to 37%.

Why the trend away from enterprise bargaining has occurred and its significance for future policy settings for enterprise bargaining is discussed later (section 4.3), but the shift has highlighted the importance of awards in Australia's WR system. Notwithstanding its dramatic growth and that about 2.7 million employees were on the award in 2021, the award system has been a neglected aspect of public debate about workplace relations.

In the context of bargaining, awards provide a fall-back position in case negotiations fail or bargaining is deemed too costly and sets the benchmark level of wages and conditions that, under the Better Off Overall Test (BOOT), an EA cannot fall below, even if it is only for a single employee. The inextricable links between enterprise bargaining and awards means that any defects or virtues in awards tend to be inherited by agreements. Moreover, the FWC's decisions about changes in the hundreds of minimum wage levels that are specified in more than 100 awards (and within awards across multiple classification levels) partly influence the wages of other employees because otherwise wage relativities would become increasingly compressed and out of step with the varying productivity of different employees. That link is often explicit as a significant share of agreements have annual wage increases linked to the minimum wage (DEWR 2022, p. 33). Outside their flow-on effects on enterprise bargaining, the award system is intended to meet social and equity goals (a specific feature of the modern awards objective in the FW Act) and to counter the bargaining power that employers could sometimes wield (Breunig and Rose 2019, pp. 25, 29).

Awards can affect productivity in varying ways. Given each award prescribes often unique wages and conditions, they affect wage relativities between tasks within a business, age groups, occupations, and industries. This may limit the efficient and productive allocation of labour across the economy. It may also

affect people's initial education choices and the incentives of workers and businesses to acquire skills over their working lives. Their complexity increases business costs. On the other hand, for employers within the coverage of a given award, the least productive businesses would not be able to compete simply by lowering wages or conditions — if forced to exit, the reallocation of resources would promote aggregate productivity (Braun 2011). Further, their prescriptive nature may reduce the costs of bargaining wage levels for some employers. As noted by the Hon. Reg Hamilton:

It may be that employers and perhaps unions should not use approved enterprise agreements as much as in the past and should now rely more on awards in some sectors where market rates are close to award rates given the difficult calculations required if penalties are to be rolled up in a single annual rate, for example. (sub. 50, p. 26)

While any given award is prescriptive in its requirements, viewed over time, the award system is more flexible than it might seem at first glance. As noted by O'Neil (2021, p. 425):

... during the pandemic awards proved to be a mechanism that could quickly facilitate broad changes without the need to wait for parliamentary processes or workplace-by-workplace negotiations.

While the 4 yearly award review³⁹ process is in its final stages, award review remains an ongoing feature of the awards system. As noted later, s.157(1) of the FW Act gives the FWC significant powers to vary *some* aspects of awards so long as the variations meet the modern awards objective. Moreover, on its own initiative the FWC added a temporary schedule (schedule X) to multiple awards to address some of the problems that the pandemic posed for employers and employees. It is possible (though untested) that changes in working arrangements in many businesses originate from award changes rather than enterprise bargaining. While workplace culture, not so much black letter law, is a central aspect of a productive workplace regardless of whether a workplace is award reliant or otherwise, a problem confronting enterprise bargaining in some industries is that poor culture can be reflected in highly restrictive terms in an agreement (PC 2022d).

In light of its central role in the workplace relations system and its far-reaching impacts, the effective functioning of the awards system is critical to a productive and adaptive economy.

An award system geared to a future economy

The FW Act sets out complex processes to make, vary or revoke an award, or to vary award minimum wages (box 4.2). There are opportunities to improve the criteria that must be met during these processes, including by:

- improving the clarity of the modern awards objective
- better facilitating variations to awards that improve outcomes under the modern awards objective.

Implementing a clearer modern awards objective

While the minimum standards set out in awards play an important role in the context of community norms regarding fairness, the awards system entails various other economic effects and compliance costs. The modern awards objective is one source of the complexity of awards and a potential barrier to their adaptability. The FWC is required to balance ten considerations in the modern awards objective (defined in s.134 of the FW Act) when varying award minimum wages or when making, varying or revoking awards (box 4.2). As noted by the FWC, no single matter is given primacy:

³⁹ Before 2018, the Fair Work Commission was required to review all modern awards every 4 years.

The obligation to take into account the s.134 considerations [in the modern awards objective] means that each of these matters, insofar as they are relevant, must be treated as a matter of significance in the decision-making process. No particular primacy is attached to any of the s.134 considerations and not all of the matters identified will necessarily be relevant for a particular proposal to vary a modern award. (FWCFB 8092 *Pest Control Industry Award 2010* — Substantive claims [2019], 2 December 2019, at 13)

Box 4.2 – The modern awards system

The processes for varying, creating or revoking a modern award

There are different processes for varying, creating or revoking a modern award, depending on whether changes relate to award minimum wages, the default superannuation fund term or other aspects in an award. For award minimum wages, the process will also depend on whether changes are made during the annual wage review — where an Expert Panel reviews the National Minimum Wage and modern award minimum wages — or outside of the review.

The FW Act defines in which circumstances the FWC can make, vary or revoke awards on its own initiative, or on application by an eligible party. Eligible parties are generally employers, employer organisations, employees, unions or outworkers that are affected by the award.

- An award may be made, varied (other than to vary minimum wages or a default fund term) or revoked under s.157(1) of the FW Act, on the FWC's initiative or on application under s.158. The FWC must be satisfied that these change is necessary to meet the modern awards objective. Additional criteria apply to changing the coverage of a modern award or to revoke an award.
- Outside of the annual wage review, award minimum wages can be varied under s.157(2), on the FWC's initiative or on application under s.158, if the variation is justified by work value reasons and if the variation of award minimum wages outside of the annual wage review is necessary to achieve the modern awards objective.

There are three criteria from the FW Act that may apply to award variation, depending on whether the determination is relating to minimum wages (and if so whether the determination is outside of the annual wage review):

- **the modern awards objective**, which must be satisfied by awards in tandem with the NES (s.134)
- **the minimum wage objective**, which applies if the FWC is setting, varying or revoking award minimum wages (s.284)
- **work value reasons**, one or more of which the FWC must meet if choosing to vary minimum wages outside of an annual wage review (s.157(2A)).

The FWC can also make a determination to vary an award, including award minimum wages, to remove an ambiguity or uncertainty or to correct an error under s.160, or upon referral by the Australian Human Rights Commission under s.161. Minimum wages may also be increased by an equal remuneration order made under s.302, which will override less beneficial modern award minimum wages.

Sources: Australian Government (2008); Gillard (2008); Stewart et al. (2016); *Fair Work Act 2009* (Cth).

A more streamlined modern awards objective could reduce complexity, improve transparency and assume a broader community wellbeing perspective when determining appropriate award content (recommendation 7.13).

To that end, the modern awards objective could be made clearer and better targeted by replacing the paragraphs of s.134(1) with seven paragraphs that cover: a) the needs of the employed, b) the need to increase employment, c) the needs of employers, d) the need to achieve gender equality in the workforce, e) the needs of consumers, f) the need to ensure modern awards are easy to understand and g) the likely impact of any exercise of modern award powers on efficiency and productivity (recommendation 7.13). Such a change would give relatively greater prominence in award determination to the unemployed and consumers who are not often represented in FWC hearings. This does not mean the seven considerations need be given equal weight, nor that a given consideration be given *presumptive* primacy (PC 2015c, p. 374) — consistent with previous Full Bench rulings. Decision making would prioritise the wellbeing of the overall community and would be informed by consideration of likely benefits and costs (and the expected magnitude, incidence and persistence of effects) of award changes to stakeholder groups.

Allowing for award variations to improve outcomes beyond ‘the extent necessary’ to achieve the modern awards objective

The FW Act can limit the degree to which the FWC can make improvements to awards. The FW Act (s.138) states:

[a] modern award may include terms that it is permitted to include, and must include terms that it is required to include, only to the extent necessary to achieve the modern awards objective and (to the extent applicable) the minimum wages objective.

This has raised the issue of the distinction between award variations that are ‘*necessary*’ to meet the modern awards objective and variations that are ‘*desirable*’ to improve the objective’s outcomes variations. As Justice Tracey of the Federal Court highlighted:

That which is necessary must be done. That which is desirable does not carry the same imperative for action. While this distinction may be accepted it must also be acknowledged that reasonable minds may differ as to whether particular action is necessary or merely desirable. (*Shop, Distributive and Allied Employees Association v National Retail Association (No 2)* [2012] FCA 480, 11 May 2012, at 46.)⁴⁰

The FWC has at times interpreted s.138 to include proposals to vary awards that *better* achieve the required objectives,⁴¹ though it cannot be assumed that this would characterise any decision about variations. Certainty could be achieved by amending the FW Act to allow award variations in awards that meet the modern awards objective, but that could be improved (recommendation 7.13).

This may appear to be a trivial change, but it can be likened to the difference between just meeting some standard and exceeding it. Excellence is achieved by the latter. The reform would provide an avenue for award revisions that flexibly maximised potential outcomes — especially as what is ‘desirable’ changes with economic and labour market developments.

⁴⁰ The distinction made by Justice Tracey in 2012 was referred to again in a 2022 Full Bench of the FWC ruling regarding the wording in the plain language redrafting of shutdown provisions in awards.4 yearly review of modern awards—Plain language—*Shutdown provisions* [2022] FWCFB 161, 25 August 2022, at 43.

⁴¹ For example, the *Appeal by Australian Municipal, Administrative, Clerical and Services Union* [2013] FWCFB 1228, 5 March 2013, at 39. and in *Menulog Pty Ltd* [2021] FWCFB 4053, 12 July 2021. Menulog’s claim that a new on-demand delivery services award would ‘better achieve’ s.134(1)(g) of the modern awards objective compared with varying an existing award was not rejected by the FWC, although the FWC asked that Menulog provide further submission and evidence for the claim, among Menulog’s other claims relating to the modern awards objective.

Award complexity and flexibility

Despite the significant streamlining of awards during the modernisation process, the Productivity Commission's 2015 inquiry into the Workplace Relations Framework found a broad range of flaws in awards, even in the presence of existing individual flexibility arrangements⁴² (PC 2015c chapter 8). Examination of the content of current awards suggests that this situation has not greatly changed since 2015.

Complexity can make it hard for employees to discover whether they have received the right pay and impose compliance costs on employers and create uncertainty about whether they have met the obligations set out in the FW Act. Moreover, the rigid imprint of history on current arrangements still plays a major role in their content.⁴³ There is relative inertia in the pay relativities, allowances, rostering and other arrangements that affect the organisation of a business and the wellbeing of employees, and, until recently, penalty rates. Labour markets can change much more rapidly than awards.

There are two broad, but associated, policy approaches to these issues. There are grounds for:

- a systematic process for appraisal of features of those awards that reduce productivity and economic prosperity, are unfair or no longer fit for purpose
- reducing the compliance costs of using awards through award regulatory technology ('regtech'), and making awards easier to understand through education programs and the continuation of the FWC's plain language redrafting program.

The first approach will often, but not always, entail the second.

Changing awards is not about tilting the conditions of an award in favour of one party or another. If changes to an award — for example, those arising from changes in work practices — raises productivity, the FWC would have a greater capacity to make larger changes to award wages.

Reforming the rigidities of awards, while retaining their basic features

Reinstatement of periodic reviews of all awards would be a costly exercise, particularly given that many awards are unproblematic. At the same time, with the abandonment of the 4 yearly award review process, the FWC has been left with a varied capacity to change award features. It has a high level of flexibility in amending aspects of awards that do not relate to modern award minimum wages, such as hours worked and rostering. But it is unable to vary the 100s of award minimum wages,⁴⁴ except:

- in its annual wage review, though typically the percentage increases in award minimum wages are the same across and within awards and so not a mechanism for revisiting whether the initial wages are appropriate across the more than 100 modern awards⁴⁵

⁴² Individual flexibility arrangements are clauses in awards that allow employers and employees to agree to variations of when work is performed, wage rates, overtime rates, penalty rates, allowances and leave loadings.

⁴³ For instance, the *General Retail Industry Award 2020* contains the Broken Hill Allowance, an additional allowance payable to award-covered employees in Broken Hill in lieu of a fifth week of paid annual leave, which had been removed by the Fair Work Commission during the creation of modern awards. Four weeks paid annual leave is the minimum entitlement under the NES (SDA 2019).

⁴⁴ There are a few other exceptions, but these are esoteric.

⁴⁵ There have been a few (constrained) exceptions to this. For example, the annual minimum wage determinations for 2020 to 2022 were phased in at different times depending on the award — reflecting concerns that the potential disemployment impacts of the COVID-19 pandemic might be different across different industries. In addition, wage relativities were slightly compressed in 2022 because there was a flat \$40 a week increase for low-paid workers, but a 4.6% increase for employees above the \$869.60 weekly threshold.

- between annual wage reviews, but only for ‘work value reasons’ (alongside the requirement that varying award minimum wages outside the annual wage review is necessary to achieve the modern awards objective, and that the minimum wages objective is also met) under s.157(2) of the FW Act, which are factors deemed to justify an employee’s pay, including the nature of work, the level of skill or responsibility in doing the work and the conditions under which the work is done.

The reach of these restrictions is potentially wide given the large number of minimum wages set in awards and that they relate to almost all types of occupations, including academics, pilots and doctors. The requirement that work value reasons are necessary to justify consideration of award minimum wages revisions between the annual wage reviews embeds too narrow a framework for wage setting.

The 2022 FWC case relating to minimum wages for direct aged care workers provides an illustration of some of the difficulties. The FWC handed down an interim 15% increase in various award minimum wages based on work value.⁴⁶ In doing so, the FWC principally relied on two rationales for higher pay:

- that wages were low because of gender biases
- the skills required and the complexity of tasks to undertake aged care work had risen over the past two decades.

The framework underpinning work value reasons presumes that a given set of defined tasks has an objective value to society or the economy, and that a disinterested party — the Fair Work Commission in this case — is well-placed to determine this value independently of the actual outcomes of labour markets. The principle is that ‘aligning rates of pay in one modern award with classifications in other modern awards with similar qualification requirements will support a system of fairness, certainty and stability’.⁴⁷ At various times, work value cases have accordingly sought to find comparator rates that match skill levels. For instances, in successive work value cases, the so-called ‘C10 Metals Framework Alignment Approach’ — which takes the wage rate for a Certificate III classification in the manufacturing award as a starting benchmark — has been influential.⁴⁸ Work value is driven principally by the premise that it would be unfair and socially unjust to pay one set of workers with similar skills and tasks in one industry less than those in another. Accordingly, work value is largely a social goal and does not *necessarily* relate to the desirable outcomes of efficient labour markets.⁴⁹

Yet the latter should play a significant role in setting wage relativities, including when labour markets are not functioning well. For example, in the aged care market, governments loom large as rule-setters, price regulators and funders of services, such that they have a capacity to influence the labour markets of these services and are aware that wage cost pressures will be reflected in fiscal pressures. Even had there been no work value reasons, arguably the nature of the aged care labour market alone should have justified close examination of relative bargaining power and the potential for it to exert an inefficient downward pressure on wages in this sector. In this case, labour market considerations would suggest increases in minimum wages regardless of work value reasons, though pinning down the appropriate increase would be difficult, as it is

⁴⁶ *Applications to vary modern awards – work value – Aged Care Award 2010 – Nurses Award 2020 – Social, Community, Home Care and Disability Services Industry Award 2010 – Decision*, [2022] FWCFB 200, 4 November 2022
⁴⁷ [2022] FWCFB 200 at 192.

⁴⁸ The application of the C10 approach does not mandate that wages all be set equivalent to one or other of the relevant classifications in the relevant award but is a starting point ([2022] FWCFB 200 at 179). At times, the other benchmark is set by wages associated with different qualifications under the Australian Qualifications Framework.

⁴⁹ This is not to say that what happens in labour markets is free of the biases of employers, regulators and society generally. For example, Broadway and Wilkins (2017, p. 26) argue that it is likely that ‘award-wage decisions have been influenced by observed “typical” wages in industries and occupations, and male-dominated fields have benefited from a long history of strong unionisation that led to higher average wages’.

using the work value framework. In this case, work value and labour market reasons coincide in concluding that the minimum wages in the relevant industry awards probably anchor wages at too low a level.

However, the two frameworks may reach contradictory conclusions in other cases. The rationale for inertia in wage relativities based on work value reasons is likely to be problematic under certain labour market conditions. Minimum pay rates in certain awards for given classifications may become too high, affecting the viability of businesses that intensively employ such employees and the demand for the particular type of labour.

A potential saving grace of current arrangements is that the award system sets floors for wages at different classifications, rather than ceilings. It is therefore possible for an employer to vary wage relativities by paying more than the award wage for certain classifications. Nonetheless, this will have significant effects on the overall wage costs of the business. Moreover, the apparent capacity to freely raise wages for any given classification above its award level may be constrained in enterprise bargaining if employees collectively wish to protect the award relativities (Broadway and Wilkins 2017, pp. 9–10).

In this context, the FWC's settings for the hundreds of minimum wages across the more than 100 awards should give much greater prominence to the relevance of labour markets including, among other factors, the effects of the current wage relativities on the demands for skills, educational qualifications and occupations, the way labour is organised in businesses, and the incentives for labour mobility and training.

The restraints under s.157(2) of the FW Act and the FWC's practices in the annual wage review limit a wider consideration of the factors that should inform award minimum wages. As such, while work value reasons may still have relevance to a variation in award minimum wages *outside* an annual wage review, it should be removed as a *requirement* for any such variation. Instead, the FWC should have the same power to adjust award minimum wages in award reviews as the minimum wage panel currently has in the annual wage review (recommendation 7.13).

The new approach would not eliminate consideration of work value reasons so long as these were relevant to the criteria set out in the modern awards and minimum wage objectives, or with an equal remuneration order. Instead, it would open up wage determination to all of the factors that the FWC can consider when setting other aspects of awards. For example, the FWC's penalty rates decision⁵⁰ was based on consideration of the labour market and business effects of such rates and did not implicitly or explicitly apply a work value framework. The criteria were purely those set by the modern awards objective.

Adopting this broader approach introduces greater consistency in award decisions because the benefits to an employee of an award relates to all of its contents — and not just to minimum wages. Furthermore, the separation of modern award minimum wages from other aspects of awards makes it difficult to consider reforms to specific awards that seeks to trade these off against each other or that take into account the way labour markets are functioning.

Where a broader approach benefits both employers and employees, it would be conceptually in step with one goal of enterprise bargaining — the discovery of changes that overall create mutual benefits. However, notably, there is no equivalent to the BOOT in award changes, so it is possible that under this new model, the FWC could make a change to awards that leads to gains for many workers even if some are made worse off. In fact, even a net employee benefit is not required (for instance, in the FWC's changes to penalty rate in 2017, many rates were dropped without compensating increases in ordinary time wage rates).⁵¹ Conversely, in circumstances where a group of employees have low bargaining power and are unlikely to benefit from enterprise bargaining, then

⁵⁰ 4 yearly review of modern awards - *Penalty Rates*, [2017] FWCFB 1001, 23 February 2017.

⁵¹ [2017] FWCFB 1001.

changes to specific awards could be a vehicle for providing pay increases that are higher than those usually provided through annual wage reviews, as was the case with the *Aged Care Award 2010*.

Developing an adaptive award review process

Previous (now abolished) 4 yearly reviews of awards involved reviewing *every* clause from *every* award and were resource-intensive for parties wishing to participate in the process, as well as the FWC. Reviews that are excessively time-intensive may deter potential parties who wish to participate.

Future award review processes should be structured to avoid the pitfalls of the (now abolished) untargeted 4 yearly reviews of modern awards (PC 2015c, p. 341). A simpler approach would be that the FWC identify awards that have significant deficiencies in their wage relativities or some common flawed feature across awards ('hotspots' as described in PC 2015c, p. 369) and then modify these based on its own research and evidence presented by external stakeholders, such as union and employer groups. It could undertake this task at any time.

The FWC could particularly focus its assessments on aspects of awards that:

- overly restrict work practices and limit flexibility for employees as well as employers
- have wage relativities that are out of step with relative productivities and labour demand
- may disadvantage particular types of workers and businesses (say those in some regional areas).

For instance, the level of prescriptive detail applied to classification levels within awards calls for scrutiny. Many awards prescribe detailed descriptions of tasks and responsibilities for different occupations and levels. This can be useful in aligning with technical qualifications in some occupations. However, in others, this degree of prescriptive detail is likely to be unnecessary and may present a barrier to evolving work practices. For example, the *Banking, Finance and Insurance Award 2020* stipulates different pay levels for people managing 5–10 staff or 10 or more staff — a distinction that may or may not be relevant to the degree of responsibility in many modern workplaces. Excessively prescriptive terms of this kind can also be a source of undue inflexibility for bargaining to the extent that proposed agreements are tightly tied to the award via the BOOT (as discussed further below).

Various stakeholders made suggestions about potential award reform options. For instance, the Ai Group proposed awards could be improved by moving sections to the NES:

Matters that are primarily dealt with in the NES should be largely removed from awards and replaced with references to the NES provisions, just like what has occurred with casual employment definitions and casual conversion provisions. A similar approach should be taken with annual leave, personal/carer's leave and other topics that are primarily dealt with in the NES. (Ai Group 2022, pp. 1–2)

The NES provides a set of rights and entitlements for all employees, which cannot be excluded or lessened under any form of agreement or individual arrangement.⁵² Placing an entitlement in the NES instead of individual awards could represent a strengthening or weakening of an entitlement for different classes of employees relative to the existing awards if there is a great deal of variation in how an entitlement is specified between different awards. For instance, some awards — such as the *Manufacturing and Associated Industries and Occupations Award 2010* and the *Building and Construction General On-site*

⁵² The Productivity Commission is also undertaking an inquiry on Carer Leave, which examines the potential impact of amending the National Employment Standards to provide for an additional entitlement to unpaid carer's leave, with a draft report expected to be released in early 2023.

*Award 2010*⁵³ — had casual conversion clauses that allowed for conversion for eligible casual employees after six months of employment, rather than after 12 months as specified in the NES.

Some award terms *could* be more easily transferred to the NES than others, including administrative provisions that could apply consistently across awards (for instance the cashing out of annual leave) or extensions to existing NES provisions currently provided in multiple awards (such as any expansion of the right to request flexible working arrangements). However, whether much harmonisation is desirable, feasible, and whether the process to achieve it would be efficient is uncertain. Further detailed analysis and consultation would be required to evaluate the merits of enshrining more award features into the NES.

Ai Group (sub 43, p. 8) highlighted that the need to work hours continuously is less relevant, as specified in some awards, when an employee is working from home. Ai Group also stated that minimum engagement requirements, rest breaks and penalty rates did not 'reflect the realities of remote work or working from home arrangements' (sub IR179, p. 13). However, wholesale modification to awards based on greater working from home is complicated given many users of awards will still work at a physical workplace and the level of discretion workers have available to structure their work time while working remotely will vary. For instance, a remote call centre worker's working hours will be strongly affected by the employer's opening hours for phone support and the number of calls received. The Business Council of Australia (sub IR181, p. 15) suggested award simplification could focus on 'removing complexity in each of the awards, as opposed to previous attempts to combine awards into a smaller overall number'.

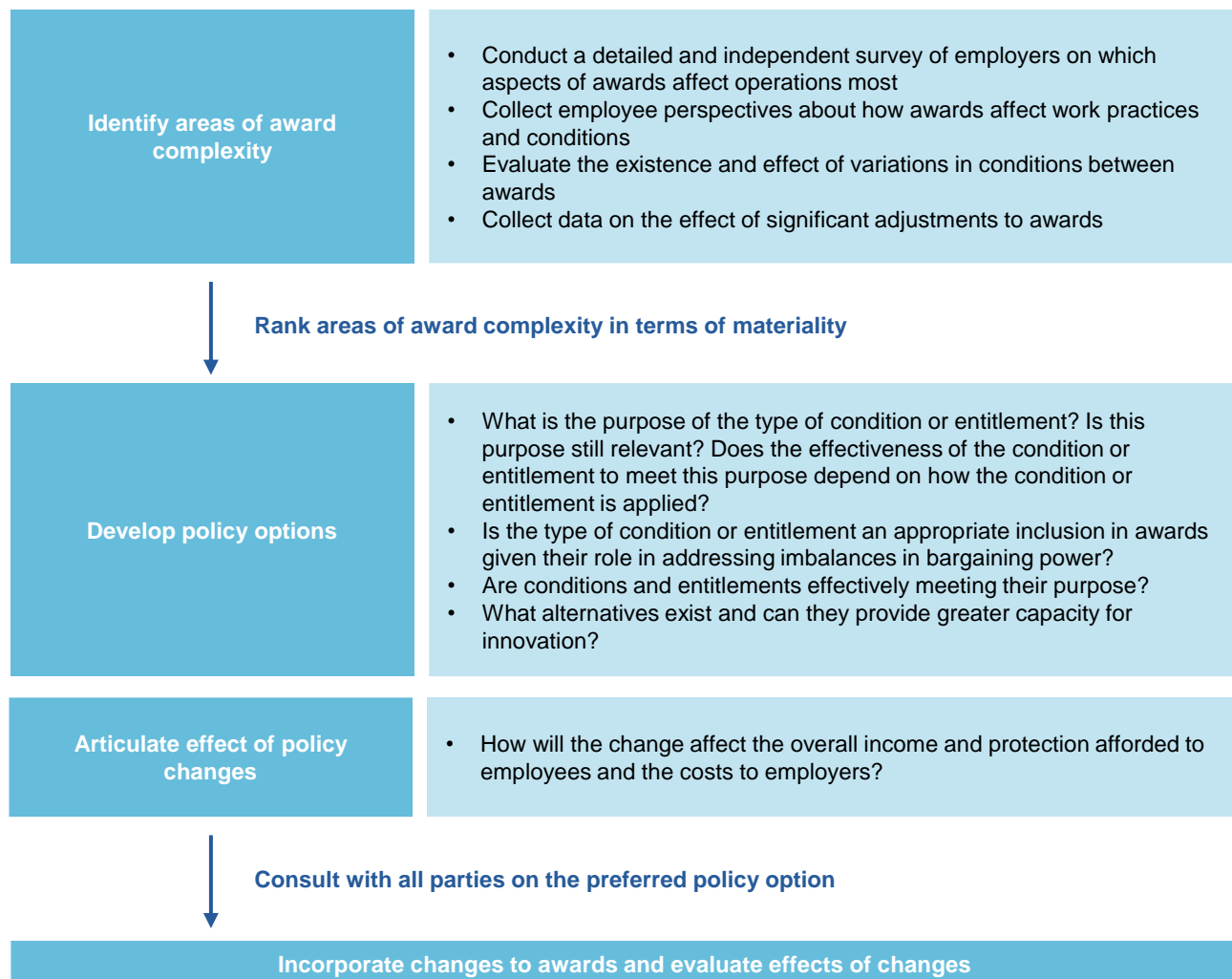
The FWC's evidence base will be key

Award review should be informed by quantitative and qualitative evidence and analysis and focus on material issues (figure 4.2), recognising that participating in award review processes can in itself be resource-intensive for parties. As an independent body and the ultimate maker, the FWC's practices are particularly important, and it should give considerable primacy to rigorous research, including undertaken internally or commissioned, in making its decisions.

In contrast, while interested parties — usually representing employer, employee or government interests — present evidence to support their held positions, not all of their evidence is robust or of the same quality. Indeed, FWC decisions frequently refer to deficiencies in evidence provided by some parties (PC 2015c, p. 341). Nevertheless, the FWC should continue to use information and ideas provided by stakeholders, including via applications to vary awards. The FWC should also survey employers on the aspects of awards that restrict work practices and consult with employees on where awards could be improved (recommendation 7.13).

⁵³ *Manufacturing and Associated Industries and Occupations Award 2010* [MA000010] as at 4 December 2017 and *Building and Construction General On-site Award 2010* [MA000020] as at 20 November 2020.

Figure 4.2 – A new way of assessing and addressing award deficiencies



Source: Adapted from PC (2015c, pp. 348, 369).



Recommendation 7.13

A more efficient and fairer approach to adjusting awards

The Australian Government should amend the *Fair Work Act 2009* (Cth) to:

- replace the paragraphs of s.134(1) with seven paragraphs that cover:
 - (a) the needs of the employed
 - (b) the need to increase employment
 - (c) the needs of employers
 - (d) the need to achieve gender equality in the workforce
 - (e) the needs of consumers
 - (f) the need to ensure that modern awards are easy to understand
 - (g) the likely impact of any exercise of modern award powers on efficiency and productivity.
- remove the need for work value reasons alone for variations to award minimum wages outside of the Annual Wage Review, allowing the Fair Work Commission to have the same power to adjust award minimum wages in award reviews as the minimum wage panel currently has in annual wage reviews
- make it explicit that the Fair Work Commission should make variations to awards that would *better* achieve the modern awards objective, rather than only being required to make changes that are necessary to comply with the objective
- require that when reviewing and varying modern awards, the Fair Work Commission should use robust analysis to set issues for assessment, prioritised on the basis of likely high yielding gains, and consult widely with the community on reform options.

The promise of awards as options

The FWC has promoted greater flexibility in awards by giving employers options about how to be compliant with an award, spurred by the disruption associated with the COVID-19 pandemic, but with long-run implications. The most notable recent case involved a variation in the *Hospitality Industry (General) Award 2020*.⁵⁴ The FWC agreed to give any relevant employer the option to pay a premium on the usual award pay rate (a loaded rate) to certain groups of full-time employees in exchange for giving up some overtime, penalty rate and split shift payments. The intention was to avoid making any employee in the given groups worse off, while leaving it in the hands of the employer whether to take up the option or not:

... we would expect that employers will weigh the administrative benefits and any short term additional regulatory burden when deciding whether to utilise the Loaded Rates Arrangements.

On balance, this factor weighs in favour of making the amended draft determination. ([2021] FWCFB 5371 at 112)

Various unions opposed changes to the award, primarily because they argued that some employees might be made worse off. The FWC decided that, on balance, and given other safeguards, this was not a valid concern (para 52). However, regardless of the merits or otherwise of the cases put by the various parties, the

⁵⁴ Decision by the full bench of the Fair Work Commission in relation to an application to change the hospitality award ([2021] FWCFB 5371).

most important aspect of the decision was that it reconfigured an award into a menu that increased flexibility about how to manage workplaces.

There are strong grounds for the FWC to take a similar approach in developing options in awards that let the employer choose the one that most suits their circumstances, but subject to the strict provisos that any option must still meet the modern awards objective, and that the employer undertakes appropriate consultation with affected employees (recommendation 7.14).⁵⁵ The instances where this applies should extend beyond loaded rates cases to any award where menus are likely to improve outcomes. This does not require changes to the FW Act.



Recommendation 7.14 **Introducing menus into industrial awards**

In making variations to awards, the Fair Work Commission should seek to include options that allow employers some choice about how they can meet award requirements, subject to meeting the modern awards objective and appropriate consultation with affected employees.

Reducing compliance costs and improving the process of creating awards through award ‘regtech’

While no panacea for unnecessary complexity, award regulatory technology (‘regtech’) is technology that can help businesses comply with awards or assist the FWC to adjust award content more efficiently. This would also recognise that many errors in payment are due to error, rather than deliberate actions. As noted by the Fair Work Ombudsman (FWO): ‘Underpayments often happen because of a mistake or payroll error’ (FWO 2023).

A related form of technology is used by some businesses to quantitatively assess whether proposed EAs pass the BOOT.

For employers, award regtech includes ‘award interpretation services’, which can calculate the amount of pay owed to an employee that is paid exactly at the award without an employer needing to manually code pay rates (such as the hourly rate at ordinary hours, penalty rates and allowances) into software. Award interpretation services — such as PaidRight and Tanda — claim that their tools can calculate new pay rates following an award variation, for example following the FWC’s Annual Wage Review. Such services tend to focus on high-coverage awards, particularly those in the retail and hospitality sectors. Award regtech can also be used to identify where employees have potentially been paid below the minimum wages specified in awards.

To date, award regtech has mainly been developed by private sector payroll software providers. However, government can still play a role in supporting award regtech, including to improve the existing public FWC and FWO tools and calculators that help users navigate awards. For instance, the FWC has developed the Modern Awards Pay Database API (an ‘application programming interface’), which is a mechanism that allows software developers to directly extract values for the minimum rates of pay, allowances, overtime and penalty rates in an automated manner, rather than having to manually update payment values coded in software following the annual wage review or other changes to award minimum wages.

⁵⁵ The loaded rate arrangement includes a straightforward consultation arrangement as spelt out by the Fair Work Ombudsman (FWO 2021).

Further development of award regtech solutions would benefit from continued collaboration between government, developers, and award users. As an example, during the development of the Modern Awards Pay Database API, the FWC consulted digital service providers on the technical design of the API and gathered information on how the API could be used in practice by digital service providers (dsanz, sub. 18, p. 2). Digital service providers were also able to test the Modern Awards Pay Database API before the API was publicly released.

For the FWC, award regtech could improve the award drafting process through analysing the effects of proposed pay-related award determinations on different stakeholder groups, aiding the process of considering effects on the modern awards objective and minimum wages objective. Award regtech could also help identify potential ambiguities in award content. In the longer term, the Australian Government will play a central role in exploring the feasibility of using software code to represent awards ('Rules as Code'), which could improve the process of handing down award determinations by quantifying potential outcomes and improving the drafting of awards.

Exploring the feasibility of applying a Rules as Code approach to awards

Rules as Code is a label applying to various government initiatives that involve the coding or marking up of legislation during drafting, with the aim of improving drafting processes and how legislation is provided in digital formats (Waddington 2020). Despite misperceptions, Rules as Code does not typically involve or refer to the use of AI to create or interpret law.

Various examples of Rules as Code exist outside of awards. For instance, the coded rules for the NSW Energy Security Safeguard allow policymakers to visualise the relationships between different parts of the legislation and to simulate policy scenarios using an interactive dashboard (Harinath, Ipsen and Parameswaran 2021).

In the awards space, a Rules as Code approach *could* potentially involve:

- using coded rules to quantify the effect on different stakeholders of creating, varying or revoking an award before an award determination is handed down
- using coded rules to model the working patterns of employees to determine whether an EA makes employees are better off overall compared with awards (the Hon Reg Hamilton, sub. 50, p. 26). In this respect, coded rules and the software that uses them could also be used to facilitate the inclusion of reconciliation clauses in EAs. A reconciliation clause allows an employer to top up payments to any employee who, over some period of time, is subsequently found to be worse off than under the relevant award.⁵⁶ Absent such a clause, the FWC may refuse to approve an agreement because it *might* fail the BOOT under future working arrangements, reducing the flexibility of agreements (Townsend 2021).⁵⁷ However, the calculations required for reconciliation are complex. Coded rules lower compliance costs and provide greater certainty to employees, their representatives, employers and the FWC and FWO that reconciliation clauses are being used accurately

⁵⁶ For example, clause 41 of the *Commonwealth Bank Group Enterprise Agreement 2020* sets out the detailed factors that provides top-up payments if the employee was found ex post not to be better off compared with the award.

⁵⁷ The exact *specification* of a reconciliation clause, if present, will be important in determining whether an agreement passes the BOOT. For example, in [2017] FWCFB 1664, the Full Bench did not find the reconciliation clause in the employer's undertaking sufficient to pass the BOOT. The reason was that the FWC found that the undertaking did 'not create an enforceable right to any payment', because it placed the onus on the employee to request a review of their wages compared with the report. If an employee did not make a request, 'whether through ignorance or design, or perhaps because an affected employee simply lacks the time, information or ability to form a view, then no obligation to conduct a review, much less "make good" any shortfall, arises [in the agreement]'.

- using coded rules to identify legal ambiguities or uncertainties in award content. The process of converting awards to code may highlight ambiguities in the written text, which can be remedied by drafters. Simulations of the effects of proposed award variations may also identify unintended outcomes
- publishing machine-readable rules, which payroll software could read to automate calculation of employee entitlements after an employer inputs work characteristics such as the number of hours worked and the timing of shifts. There are existing award interpretation services offered by the private sector that can calculate pay owed to employees who are paid exactly award rates, but some services may be limited to high coverage awards, such as awards used in the retail and hospitality sector.

The complexity of Australia's awards system means that determining the feasibility of a Rules as Code approach (or limitations thereof) is not straightforward. Feasibility is unlikely to be clear until other areas of regtech tools and API development by the Australian Government are more advanced. However, the potential for regtech to improve compliance and reduce compliance costs suggest that this should remain an area of priority.

As award regtech becomes more advanced, risk management and quality assurance procedures become increasingly important. Given the automated nature of regtech, small errors in code can compound into 'systematically erroneous outcomes' (Colaert 2018). Parties involved in the regtech chain — for example, the developers of the software solutions and the governments that provided APIs and other information — have some level of control over compliance outcomes and, ideally, would have appropriately strong incentives to improve those outcomes.

Award regtech and a safe harbour

Some stakeholders have proposed that the establishment of a 'safe harbour' would encourage the take-up of award regtech and reduce compliance costs (Ai Group, sub. IR179, p. 13). Business users cannot be assured that, commercial reputation aside, software makers have complete incentives to avoid errors. In many instances, the terms of use for accounting software and award interpretation services impose limits on when the software company may be found liable, include indemnity clauses for software errors, and impose a monetary cap on liability — often the sum of subscription fees paid by the user in the past 12 months. Under a safe harbour proposal, employers who relied on regtech solutions that calculated wages under award conditions and later found that the software had incorrectly calculated employee payments could avoid legal penalties for non-compliance, providing them with regulatory certainty.

On the other hand, a safe harbour would reduce incentives for employers to proactively check their own compliance. Accordingly, to avert risks to employees of underpayment or a reduction in conditions, the likelihood of coding errors and inaccurate interpretations of the award would need to be very low for any regtech product.

In evaluating the potential use of a safe harbour, it is important to consider that errors may occur in various parts of the payment process. The end user could be the source of error, say, if the incorrect number of hours were entered, or if an employee were classified under the incorrect award, or if the incorrect classification grade within an award were used.

If a safe harbour were to be introduced, the Australian Government would need to communicate effectively to businesses to avoid misconceptions about the scope of the safe harbour. Moreover, any safe harbour would still need to maintain incentives for software developers to take care in their coding and some level of prudent oversight by employers of their payroll systems to ensure integrity in data entry and to check for manifest errors in outcomes. There would also be a need to avoid the risks that a few employers may strategically use errors to underpay employees. Overall, any safe harbour requires an even greater confidence that regtech solutions are highly accurate (finding 7.5).

Making awards easier to understand

Other channels that can help employers and employees better understand their obligations and rights under awards (but do not involve modifying the legal meaning of award content) include education and advice initiatives and improving the presentation, design and wording of awards.

For example, the FWO operates the Employer Advisory Service program, which provides free personalised advice to small businesses about how to meet their award obligations. The FWC is undertaking a plain language redrafting program, where existing modern awards are redrafted using plain language principles. Such programs are particularly valuable for industries where awards have high coverage; where awards are relatively complex; or where the users are predominantly small businesses. Industry associations and workplace relations consultants also play a major role in assisting businesses navigate the WR system.

Plain language award redrafting

Employers and employees should not require legal training to use and understand awards. In establishing the plain language redrafting program — involving a redraft of selected modern awards — a Full Bench of the FWC stated that:

[a]n award should be able to be read by an employer or employee without needing a history lesson or paid advocate to interpret how it is to apply in the workplace. (FWC 2016, p. 5)

Plain language makes an award easier to understand but without altering the legal effect of text (FWC 2022). The process also involves input from unions and employer groups on proposed changes to wording — so that stakeholders can raise possible changes in legal meaning from the updated text and can comment on the practicality of the proposed wording.

The redrafting process has applied to both individual awards and to terms that are common to several awards. As of January 2023, the FWC is examining standard clauses, references to loading or penalties, reasonable overtime, annual leave shutdown and the National Training Wage, having completed plain language redrafting for a number of awards with high coverage.⁵⁸

Principles that are used to draft plain language awards include discussing only one topic within a clause, using shorter words and sentences, making clear obligations by using ‘must’ rather than ‘shall’ and avoiding archaic language and excessively long paragraphs. To preserve legal meaning, some complex language may be preserved if there is no codified definition or ‘common understanding’ of a term (FWC 2015, p. 1).⁵⁹

Alongside simplifying language and clauses, redrafting can also involve improving the award presentation by changing the structure and design of awards so that users can more easily find information that is required. For example, the guidelines suggest that awards should avoid subparagraphs where possible, which are perceived as being ‘overly legalistic’ by award users (FWC 2016, p. 14).

Plain language drafting will also aid the development of award regtech. Awards that are easier to understand and do not sacrifice legal precision can reduce the cognitive effort required to translate award content into machine-readable rules. To successfully translate award content into code for award interpretation software or to create machine-readable rules, software developers will need to understand the legal definition of a

⁵⁸ Awards that have already undergone redrafting include the *Cleaning Services Award 2020*, *Clerks – Private Sector Award 2020*, *General Retail Industry Award 2020*, *Hospitality Industry (General) Award 2020*, *Pharmacy Industry Award 2020*, *Restaurant Industry Award 2020*, *Security Services Industry Award 2020*, the *Fast Food Industry Award 2020* and the *Hair and Beauty Industry Award 2020*, which have high coverage (FWC 2022).

⁵⁹ A list of plain language principles can be found in FWC (2015, p. 23).

term — which may be different from a colloquial understanding — and to understand how terms relate to one another. (Box 4.3 shows an example of code conversion.)

The process of translating awards into code will also involve resolving possible legal ambiguities, either by consulting with legal specialists or by raising ambiguities with the FWC, which can vary awards ‘to remove ambiguity or uncertainty or [to] correct error’. For example, Tanda, a company providing award interpretation software, has applied to the FWC to clarify the treatment of leave and absence hours in the *Clerks — Private Sector Award 2020*, although their interpretation has been disputed by the Australian Chamber of Commerce and Industry (ACCI), Australian Council of Trade Unions (ACTU), the Australian Services Union (ASU) and Ai Group.⁶⁰

Box 4.3 – Case study: Rules as Code for vacation pay entitlements as prescribed in Canadian labour legislation

As a proof of concept, the Canada School of Public Service created a set of ‘coded rules’ using sections 12 and 13 of the Canada Labour Standard Regulations, which determine vacation pay entitlements. The coded rules could then be integrated into apps, such as creating an online tool to calculate the amount owed to an employee after answering a set of questions.

To create a coded version of the legislation, the team needed to identify the legal definition of key terms (such as ‘length of service’), the relationship between terms (such as ‘employee’ and ‘medical pay’) and importantly, to clarify any uncertainties in language that were encountered (McNaughton 2020, pp. 6–8). A decision tree was also used to visualise how variables interacted in the legislation to obtain the final output, which was the total vacation pay entitlement accrued to an employee.

A prototype tool was then created using the coded rules, where the total payable amount (if applicable) could be calculated after answering a number of questions — including when the employee started, their total annual compensation and whether the employee had taken medical leave.

Source: McNaughton (2020).



Finding 7.4

Further progress is needed in helping businesses comply with awards

In addition to award simplification, it will be important for the Australian Government to continue to pursue avenues to help businesses comply with awards through the provision of specific advice, information and other increasingly sophisticated tools.

⁶⁰ AM2022/8, Transcript of Proceedings 11 July 2022 and Ai Group (2022a)

**Finding 7.5****A 'safe harbour' for award compliance has implementation hurdles**

The introduction of 'safe harbour' provisions associated with awards regtech (regulatory technology) is likely to be problematic unless award interpretation technology is significantly more advanced. Any safe harbour proposals would need to be:

- effectively communicated to businesses to avoid misconceptions about the scope of the safe harbour
- carefully designed to maintain strong incentives for software providers to develop accurate solutions and for employers to still have prudent oversight over their payroll systems, while avoiding the risks that a few employers may strategically use errors to underpay employees.

4.3 More efficient enterprise bargaining

When operating efficiently, enterprise bargaining allows employers and employees to vary wages and working conditions from those set out in the relevant awards to best suit their circumstances. While Australian evidence is scarce, international evidence suggests that enterprise-level bargaining (as opposed to more centralised forms of bargaining) is associated with higher productivity growth by allowing employers and employees to mutually benefit from the flexibility in the use of labour, and by improving matching of employers with employees.⁶¹ A well-designed enterprise bargaining system could improve the productivity and efficiency of businesses and translate to higher wages for employees — the intent of such bargaining arrangements when they first commenced.

However, with many significant changes since first introduced and in its current form and economic environment, enterprise bargaining does not seem to be delivering its intended outcomes. Its coverage of employees has declined (figure 4.1), particularly in the private sector. Wage and productivity growth has been slow.

In the ideal world, agreements are co-operative — securing benefits for employees and employers. If workplace relations law or the economic context changes, one party or the other may secure most of the gains, or the gains that might otherwise be attainable are no longer on the table because they are not allowed or the transaction costs of achieving them are too high. One party has claimed:

... a significant driver is the reality that, in most workplaces, enterprise bargaining is simply not worth the effort. Enterprise agreements generally do not deliver the much vaunted efficiencies or productivity benefits ... (de Flamingh and Ellery 2022)

⁶¹ While the empirical evidence principally relates to Europe, where regulatory arrangements for workplace relations vary from Australia, it still suggests that moving away from prescriptive models encourages productivity. Analysis from the OECD shows that economies with a high coverage of centralised bargaining systems have lower productivity growth when compared with economies with decentralised firm-level bargaining systems (OECD 2019, p. 3), noting that many other OECD economies have significantly more centralised bargaining arrangements than Australia. This is supported by firm-level empirical research showing higher productivity gains are achieved by firms that engage in firm-level bargaining than those that rely on sector-wide or centralised bargaining (Garnero, Rycx and Terraz 2018, p. 1). Firm-level productivity was found to increase in more decentralised multi-level bargaining structures of Europe by leading to a better matching of employers and employees than possible under a centralised bargaining structure (Aglino and di Mauro 2020, pp. 17–18). The increased matching of employers and employees may be facilitated by firm-level bargaining by allowing firms greater opportunity to pass on productivity gains into wages than is possible under a centralised system as firms are able to set wages relative to their own productivity rather than industry-wide productivity levels (Crisciolo et al. 2021b, p. 25).

There are debates about the sources of these weakened incentives.

Some, particularly on the union side, suggest the decline is due to lower union representation, the power of employers to refuse to bargain, the circumvention of the system through surface bargaining⁶² and restrictions on permissible matters in agreements, among other factors (ACTU 2022b, p. 45; Pennington 2020; Stanford, Macdonald and Raynes 2022, p. 13; Stewart, Stanford and Hardy 2022, p. 5).

Others, particularly on the employer side, point to the increasing complexity, the application of the BOOT, delays in the agreement approval and bargaining processes and an inability for the system to provide meaningful productivity-enhancing outcomes (Ai Group sub. IR179, p.9; Business Council of Australia sub. IR181, pp. 14–15; de Flamingh and Ellery 2022).

These factors cannot have significantly influenced agreement making by the smallest businesses — those with less than 50 employees — because they have a relatively low propensity to have agreements in the first place (figure 4.3), and the share of employees covered has fallen only slightly (by 0.7%pts between 2012 and 2021).⁶³ Agreement coverage has fallen most for employees in larger businesses, particularly those sized between 50 and 1000 employees (by 13%pts between 2012 and 2021).

Complexity is likely to play one role in frustrating enterprise bargaining for these businesses and, where feasible, should be reduced. On the other hand, it is not clear that complexity has been the decisive factor behind the *decline* of enterprise bargaining as its high level of complexity pre-dated the decline. Indeed, there has been some simplification. Changes to the FW Act in 2018 to allow the FWC to overlook minor procedural or technical errors in enterprise bargaining processes when approving an EA.⁶⁴ Moreover, the median approval time for agreements without undertakings has fallen from 30 days in 2018-19 to 14 days in 2020-21.⁶⁵ The efficacy of the FWC's outreach can also be seen in the fall in the share of approved agreements that require undertakings,⁶⁶ which are amendments required by the FWC to ensure the EA meets the requirements of the FW Act.

Nevertheless, the provisions of the law remain complex, and bargaining is still time consuming and resource intensive for parties.⁶⁷ This is notwithstanding the fact that the objectives clause for enterprise bargaining in the FW Act indicates that the framework for collective bargaining should be 'simple, flexible and fair' (s.171).

Overall, there is no obvious single explanation for the decline of employees covered by agreements among medium and larger businesses — it will likely be a range of the obstacles identified by stakeholders. In any case, even had coverage by EA not fallen, a key question is whether they deliver much when they exist. Many employers and employees will continue to form agreements because they have had them before. About 70–80% of new agreements made each quarter replace an existing agreement, which has increased

⁶² A strategy where one of the parties goes through the motions, with no intention of reaching an agreement.

⁶³ Based on data on non-managerial employees from the ABS *Survey of Employee Earnings and Hours*.

⁶⁴ *Fair Work Amendment (Repeal of 4 Yearly Reviews and Other Measures) Act 2018* (Cth).

⁶⁵ Many of the delays in approving EAs occur when the applications are not complete (not all the required forms and evidence are submitted) or non-compliant (the agreement process or content does not meet the requirements of the FW Act) (FWC, pers comms, 13 July 2022). The FWC has increasingly been working with businesses to help them understand the requirements to submit agreements that are complete and compliant, which has likely contributed to the fall in approval times.

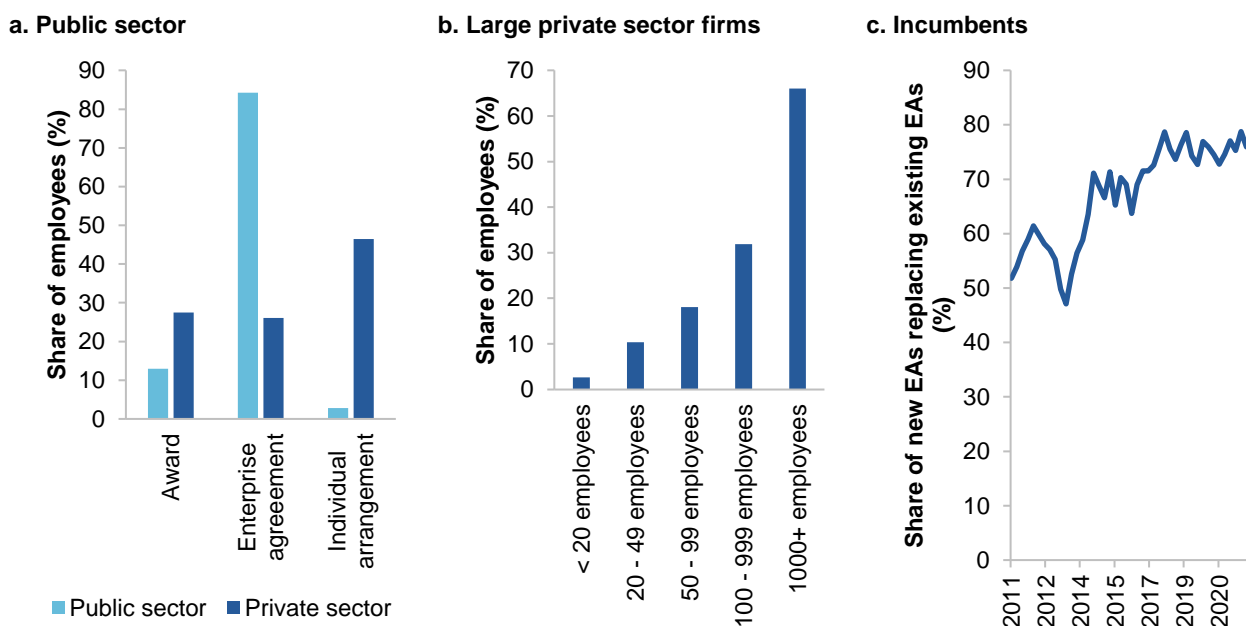
⁶⁶ If the FWC has concerns that an EA does not meet the requirements of ss.186 and 187 of the FW Act, it may accept a written undertaking that addresses this concern as part of the decision to approve the agreement. The share of approved agreements requiring undertakings fell from 66% in 2017-18 to 44% by 2020-21 based on unpublished data from DEWR's Workplace Agreement Database.

⁶⁷ Changes to bargaining introduced by the *Fair Work Legislation Amendment (Secure Jobs, Better Pay) Act 2022* (Cth) are due to commence in the 6 months to early June 2023. It remains unclear how the changes will affect the complexity and resource intensity of bargaining.

from about 50% of agreements in 2011 (figure 4.3c). Increasingly, employers and employees are leaving expired EAs in place, with 56% of employees covered by an agreement on an expired EA (figure 4.4). By their nature, expired EAs cannot include *new* productivity enhancing clauses, so the scope for them to improve productivity depends on whether existing clauses leave room for future flexibility.

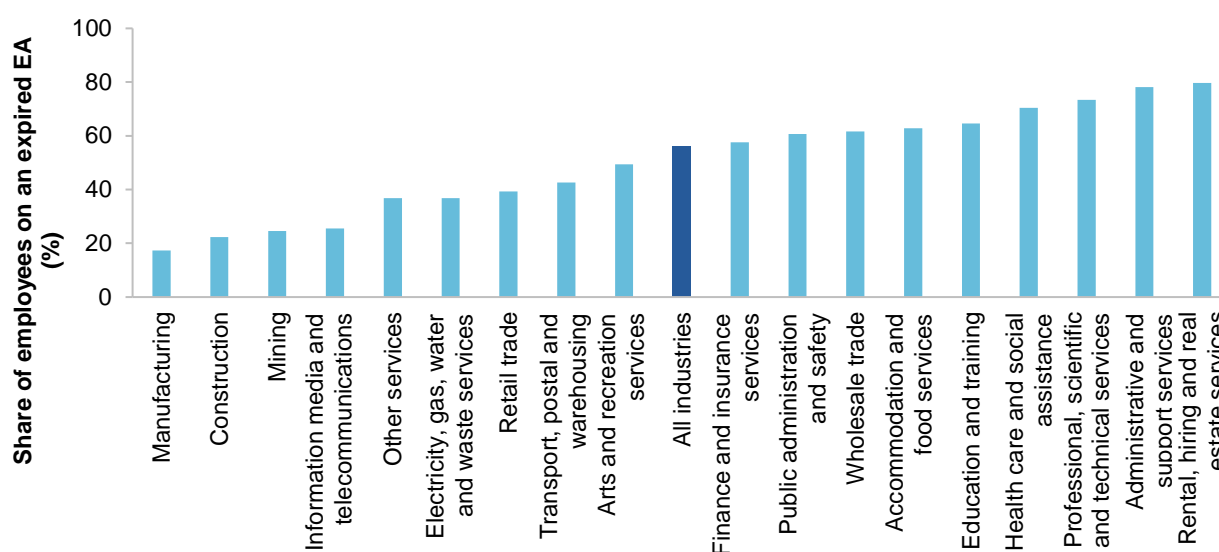
In other instances, the joint role of unions and senior management may play a role in rolling over an agreement even if the new agreement offers little additional benefit to any party. There is a strong relationship between union membership in an industry and the share of employees covered by an agreement, though it is possible for a non-union agreement to be negotiated. An employment lawyer has described an EA as a ‘cost of doing business’ and claimed that there is ‘no practical choice but to have an EA because of the industrial relationship in the sector’ (DeBoos 2022).⁶⁸ KPMG expressed the view that bargaining processes have increasingly been used as a risk management exercise with the primary bargaining item being to negotiate pay rises rather than addressing the broader goal of how to identify and secure productivity improvements that could underpin faster wage growth, as was the original intent of the system (2020, p. 6).

Figure 4.3 – Users of enterprise bargaining



Sources: Unpublished TableBuilder data from ABS (*Employee Earnings and Hours, Australia*, May 2021, Cat. no. 6306.0); unpublished data from DEWR Workplace Agreement Database.

⁶⁸ That said, over the past decade there is only a weak relationship between declining union membership rates across industries and the corresponding change in the share of employees covered by EAs (based on ABS surveys of *Trade Union Membership and Employee Earnings and Hours*).

Figure 4.4 – Most EA covered employees are on an expired agreement

Sources: ABS (*Employee Earnings and Hours, Australia*, various issues, Cat. no. 6306.0); Department of Employment and Workplace Relations (*Trends in Federal Enterprise Bargaining – March quarter 2022*).

Accordingly, increasing the use of enterprise bargaining will not in itself necessarily lead to better outcomes. Given the trade-offs between flexibility and the costs of bargaining, some employers and employees may prefer to rely on either awards or on individual bargaining. However, addressing some of the flaws in the existing bargaining arrangements could help to secure mutually beneficial bargaining outcomes.

Refocussing bargaining to enable productivity gains

Notwithstanding concerns about the functioning of enterprise bargaining, individual clauses and terms in EAs can lead to improved workplace practices and productivity gains by increasing flexibility, improving staff retention and development and increasing service quality and efficiency (as suggested by various case studies — box 4.4). Data from DEWR's Workplace Agreement Database also shows that 39% of all EAs approved since 2011 contained clauses that specifically link policies, procedures and/or practices to productivity. However, given the concerns expressed by all stakeholders about the state of enterprise bargaining, it is not clear whether these clauses have much substance or have had much impact.

Box 4.4 – Productivity improving clauses

In 2014, the Fair Work Commission undertook case studies on eight EAs to identify how individual clauses can promote productivity improvements. They identified three broad aspects of agreements that employers, employees, and their representatives saw as productivity enhancing.

Promoting flexibility

Staff retention was greater where clauses provided employees with the flexibility to decide their hours of work or gave them additional leave entitlements. Increased staff retention can improve productivity by lowering

Box 4.4 – Productivity improving clauses

recruitment costs and increasing the gains from on-the-job training and experience. Flexibility in hours worked can also improve relationships between managers and employees, which increases staff performance.

Skill development

Clauses that provided structure and/or resources for skill development — either through training opportunities or linking skill development to classification level — were associated with productivity improvements through improvements to both service quality and staff retention.

Incentives and engagement

The *Alcoa Australia Rolled Products Yennora Agreement 2013* contained clauses that provided a mechanism to engage employees in implementing work practices favourable to innovation and efficiency. Other agreements used productivity allowances to encourage more efficient practices, while also enshrining employer-employee consultation into the agreement, which was seen to increase industrial harmony, lowering time lost to disputation.

Source: Fair Work Commission (2014).

EAs need to be adaptable (or allow workplaces to adapt) to changing technologies, skill types, occupations, and work practices, as well as broader challenges. The shock to working patterns associated with the COVID-19 pandemic exemplifies the potential need to adapt EAs as economic conditions change. The pandemic illustrated that large shares of the workforce could work from home effectively, giving them flexibility, cutting commuting times and for many, increasing their productivity (PC 2021b). For many businesses, working from home was a necessity imposed by lockdowns and other restrictions, rather than a new mindset about how to organise their workforces. Many businesses have now adopted some level of working from home as a policy, and some types of provision for it are now also included in some EAs. At the end of 2019, about 3% of agreements covering about 20% of employees had some provisions for home-based work or telework (Ross 2020, p. 7), though the first agreement specifying home-based work or telework as a right was approved in late 2022.⁶⁹ The incorporation of work from home policies in EAs may well grow over time and may motivate a greater interest in using this industrial instrument. Working from home can be mutually beneficial for businesses and employees, depending on how it is managed. EAs also allow for those arrangements to be locked in over the length of the agreement, providing certainty to employees, and allowing them to make decisions on equipment and infrastructure to increase their ability to work from home without reducing their productivity.

This is just one example. There are many other aspects of EAs where productivity may be lifted by adding, modifying and sometimes removing clauses, ultimately resulting in better outcomes for all — employers and employees, and ultimately consumers. Ideally, given the shared objective of raising productivity within the workplace, such changes should develop co-operatively, drawing on the collaborative input of employees, their representatives and managers.

⁶⁹ The *Western Sydney University Professional Staff Agreement 2022* gives non-academic staff the right to remotely work two days a week (pro-rata for part-time employees) unless the request is unreasonable and disrupts the work of the unit. Hare and Marin-Guzman (2022) cite it as the first such agreement.

However, as noted above, the transactions costs of bargaining may be high, or workplace relations law may incidentally create tensions between the bargaining parties or restrict the areas where they are allowed to bargain. The result is that EA content may forgo productivity and other benefits for the parties. Two sources of potential constraints on productivity are the FW Act's treatment of permitted matters and the application of the BOOT, as discussed later in this section.

Restrictive enterprise agreement content

Certain clauses can frustrate business recruitment and innovation. Restrictive clauses like this can directly affect how an employer can backfill positions or temporarily outsource labour to meet the operational needs of the employer (for example, clauses restricting hiring and promotion in container terminal EAs). There are also clauses that indirectly affect how an employer chooses its capital/labour investment mix, by prohibiting changes to working arrangements through overly stringent consultation terms. In some cases, restrictive clauses can become endemic in a particular industry or type of work, and there may be justification for sector-specific intervention to address them (for example, chapter 9 of the Productivity Commission's inquiry into Australia's Maritime Logistics System) (PC 2022e). More broadly, it may be valuable to provide greater safeguards against unduly restrictive clauses.

Consultation terms in enterprise agreements

Under the FW Act, EAs must contain a 'consultation term' that requires the employer to consult with employees (and their representatives) about major workplace changes (such as those likely to have a significant effect on employees) and rostering changes or changes to ordinary hours of work (s.205). When an EA does not have a consultation term, a 'model consultation term' is applied to the agreement — either directly through an undertaking when the agreement is assessed by the FWC, or indirectly if a dispute arises regarding consultation requirements. In cases where an EA contains consultation terms that are laxer than the requirements of the model term, the FWC then applies the model consultation term to the agreement⁷⁰ — effectively setting the model consultation term as the lower bound for consultation terms in EAs.

The model consultation term requires employers to consult with employees (and their representatives) in the event of a definite decision to introduce a major change, or if a proposal to introduce a change to the regular roster or ordinary hours of work. Among other requirements (box 4.5), the term requires employers to consult as soon as practicable and give prompt and genuine consideration to the concerns of affected employees.

The requirement to have a consultation term is both best practice from a managerial perspective and a reasonable expectation from the employees' perspective. There are clear benefits to *genuine* consultation in the face of a major change or roster/ordinary hours changes. It may promote co-operation and better ways of achieving change in a business's practices, with benefits for productivity and employees. Accordingly, workplace relations law should continue to require genuine consultation.

⁷⁰ "The absence of a consultation term in an agreement, or inclusion of a term that does not meet the requirements in s.205, means that the agreement is taken to include the model consultation term" *Construction, Forestry, Maritime, Mining and Energy Union v BHP Coal Pty Ltd* [2020] FWC 3788, 20 July 2020 at 150.

Box 4.5 – The model consultation term

The FW Act allows for a model consultation term to apply to an EA in the absence of a consultation term in the agreement itself (s.205). The model consultation term as prescribed in Schedule 2.3 of the *Fair Work Regulations 2009* (Cth) sets out the requirement for employers to consult with affected employees following a *definite decision* to introduce a major change (exact details below) or when the employer *proposes* to introduce a change to the regular roster or ordinary hours of work.

Consultation for a major change

Employers are required to notify relevant employees (and their representatives) of a definite decision to introduce a major change to production program, organisation, structure or technology that is likely to have a significant effect on employees.

A significant effect on employees is defined as one of the following:

- the termination of the employment of employees
- a major change to the composition, operation or size of the employer's workforce or to the skills required of employees
- the elimination or diminution of job opportunities (including opportunities for promotion or tenure); or
- the alteration of hours of work
- the need to retrain employees
- the need to relocate employees to another workplace
- the restructuring of jobs.

Once the employer has made a definite decision to introduce the change, they are required to discuss with relevant employees as soon as practicable, including how it will affect employees and any measures that the employer is taken to mitigate or avert any adverse effects on employees. The employer must include, in writing, any relevant information of the change and how it will affect the employees. As a result of the consultation, employers must give prompt and genuine consideration to any matters raised by relevant employees.

Consultation for a change to regular rosters or ordinary hours of work

Unlike a major change, employers are required to consult with employees about changes to a regular roster or ordinary hours of work when the employer *proposes* to make a change. The consultation requirements are much the same as those for a major change with the exception that employers are explicitly required to consider views about the impact of the change on employees in relation to their family or caring responsibilities.

Sources: *Fair Work Act 2009* (Cth); *Fair Work Regulations 2009* (Cth).

However, more stringent consultation processes are sometimes implemented in the form of a requirement for union approval⁷¹ or majority employee approval⁷² before a change can be implemented. Just as poor managerial decisions could result where consultation processes are ignored, productivity can suffer when consultation clauses give employees and their representatives de facto power to restrict or veto changes to business models that would be more appropriately determined by management.

The NSW Trains case (box 4.6) provides an illustration of the capacity under the FW Act for consultation clauses in EAs to incidentally limit technological change. While the issue of customer safety was raised as a key concern by the relevant union (though this was contested by the enterprise), the decision of the Full Bench of the Fair Work Commission did not rest on this as the relevant matter, but rather the terms of the EA. This could have given the relevant union the power to veto other changes that had no real or apparent impact on safety.

A further concern about restrictive clauses of the type included in the *NSW Trains Enterprise Agreement 2018* is that even if restrictive clauses are ultimately not used to limit innovation and productivity improvements, giving employees and their representatives the power to do so — and using that as leverage for pay rises — could reduce business incentives to invest in cost-reducing technologies. Accordingly, a hidden cost of such restrictive clauses stems from missed opportunities to adopt innovations.

Safety is a separate issue, and one where there needs to be checks and balances against managerial prerogative. Unions play an informal role in safeguarding employees where new productivity-enhancing technologies or work practices are alleged to pose safety risks to employees or the public, where unions may be notified of — or identify — such risks. Unions also have a formal, but constrained, investigative role under the right of entry arrangements of the FW Act and the work health and safety (WHS) legislation and in some jurisdictions and circumstances, must be consulted during the creation of a return-to-work strategy. The Australian Council of Trade Unions, as the peak body for Australian unionism, also has two Members within Safe Work Australia (out of a total of 15). However, EAs are not the appropriate mechanism for *regulating* safety and the FW Act includes no positive role for such regulations to be included in agreements. Rather, safety breaches are appropriately resolved with the involvement of WHS or industry-specific safety regulators.

Using the model consultation term as the legally enforceable default

Removing the consultation clause requirement from agreements would be a blunt and counterproductive approach to resolving the problems by consultation clauses in some EAs (PC 2015c, p. 688). A better approach would be to limit the ability of stringent consultation clauses from having legal effect in any existing (or new) EA. This could be achieved by using the already present model consultation term as the only legally enforceable consultation term in EAs. This has the benefit of simplicity and flexibility. As the model consultation term is defined through regulations rather than legislation, it could be adapted more quickly to meet any problems associated with consultation processes.

⁷¹ Examples of agreements containing clauses that may require union approval in the consultation process include *NSW Trains Enterprise Agreement 2018*, *ACT Public Sector ACT Fire & Rescue Enterprise Agreement 2020-2024*, *Boskalis (Australia) Pty Ltd and The Maritime Union of Australia Division Propelled Dredging Enterprise Agreement 2018* (now terminated), *Smit Lamnalco Towage (Australia) Pty Ltd & Maritime Union of Australia Enterprise Agreement 2017*

⁷² Examples of agreements containing clauses which may require employee approval in the consultation process include *BMA Enterprise Agreement 2018*, *Emergency Services Telecommunications Authority Operational Employees Enterprise Agreement 2019*, *Jfk Interiors Australia Pty Ltd and CFMMEU Manufacturing Division Enterprise Agreement 2022-2025*, *Prima Architectural (VIC) Pty Ltd and CFMMEU Manufacturing Division Enterprise Agreement 2023*

Box 4.6 – Case Study – NSW Trains and the Australian Rail, Tram and Bus Union

The NSW Government announced a procurement contract for new trains for the InterCity fleet in August 2016, with the roll-out intended to begin in 2019 (Gerathy 2016).

One of the technological improvements of the new InterCity fleet was the inclusion of CCTV technology for monitoring the exterior of the train before the train leaves the platform (Metcalf Rail Safety Ltd 2020, p. 3). The new InterCity fleet also included traction interlocking on the cab door, which meant that the operating model could not be exactly the same as the current model involving a driver and a guard.^a In the current model, the guard is responsible for looking out the cab door to check that passengers have embarked and disembarked safely and that the train can depart safely (Metcalf Rail Safety Ltd 2020, pp. 22–23). At various times, the NSW Government has explored a driver-only operation, and a driver and customer service guard model, where the guard would have a more customer-focused role (van der Broeke 2016; Metcalf Rail Safety Ltd 2020, p. 1).

One of the operating models proposed by NSW Trains would require a reclassification of the existing roles, which would involve a 4% salary increase for drivers, but a reduced salary for guards, reflecting that the technology had reduced the scope of their duties.^a NSW Trains stated that the driver-only model would have had substantial savings, while the savings from the proposed driver and customer service guard model were ‘only marginal’.^b

The Australian Rail, Tram and Bus Industry Union (RTBU) disputed the change in roles and took the matter to the Fair Work Commission, citing Clause 12 in the *NSW Trains Enterprise Agreement 2018* (‘the Agreement’), which requires the RTBU’s in-principle approval for various changes to the Agreement. The RTBU’s interpretation was that changes to employees’ pay and conditions, including restructuring, were within the purview of Clause 12.^c

While the Deputy President of the Fair Work Commission initially ruled in favour of NSW Trains, the decision was appealed by the RTBU. The Full Bench ruled that the new role classifications fell within the purview of Clause 12 of the Agreement, preventing NSW Trains from implementing its proposals in respect to the new InterCity Fleet without an in-principle agreement with the RTBU^d — effectively giving the RTBU the power to veto changes to the operating model (and any associated efficiency gains) that stem from the design of the new trains.

The RTBU has cited safety concerns from the design of the new InterCity fleet (McKinney 2020), although NSW Trains has disputed this (TfNSW 2021). In June 2022, the NSW Government offered to retrofit guard compartments into the new InterCity fleet, in exchange for ceding the right to veto changes to work practices or technology (Hutchinson 2022). In November 2022, the NSW Government and the RTBU agreed to modify the InterCity fleet to meet the union’s concerns, with the first trains rolled out from December 2022 (O’Sullivan 2022).

a. [2020] FWC 4359 at 11. **b.** [2020] FWC 4359 at 11. **c.** [2020] FWC 4359 at 31. **d.** [2021] FWCFB 1113 at 26.

Sources: Fair Work Commission (*Australian Rail, Tram and Bus Industry Union v NSW Trains t/a NSW Trainlink* [2020] FWC 4359, 26 August 2020, [2021] *Australian Rail, Tram and Bus Industry Union v NSW Trains t/a NSW Trainlink* FWCFB 1113, 2 March 2021); RTBU (2022).

An alternative approach would be to include certain types of consultation arrangements in a list of unlawful terms in agreements. However, such prescriptive lists run into the complexities outlined in previous Productivity Commission analysis of the best ways of regulating the content of agreements across a wide range of

agreements and diverse industries (PC 2015c, pp. 676–679). (However, as noted above, in some industries there are grounds for remedying the systemic use of clauses that limit how management can run their businesses effectively — the maritime industry being an exemplar.)

The model consultation clause requires employers to provide genuine and prompt consideration to the views of employees when consulting on a major change to work practices, or on changes to rosters and ordinary hours. The term ‘genuine consideration’ (as used in the model consultation term) is now well-defined in case law as requiring input from affected employees without providing veto power.⁷³ This would temper impromptu changes by management that had major effects on employees by providing employees with an avenue to provide feedback — while removing any need for approval from unions or employees (e.g. the NSW Trains case) for decisions that reflect managerial prerogative. Further, the exercise of managerial prerogative does not preclude employers from agreeing to provide additional compensation to employees as a result of enacting a change.⁷⁴

Making the model term the only legally enforceable consultation term would not preclude bargaining parties from agreeing to other terms and having them in their EA. However, were there to be a dispute about this clause, the FWC would only consider the model consultation term, not the term in the EA.

Stipulating that the model consultation term be the only legally enforceable consultation term in EAs would go some way to further creating mutually beneficial outcomes from bargaining as employers and employee representatives would likely only agree to a term that is different from the model clause if they felt it would be beneficial to them.

Model clauses have clarity and simplicity, but sometimes there may be grounds for an enforceable upper limit in an agreement, depending on the context. There may be situations where employers agree to a consultation clause that restricts the introduction of technology or innovative work practices, which could still hamper productivity if the employer abides by the clause, despite it not being legally binding if a dispute arose. In these cases, the FWC could be given the power to authorise alternative consultation clauses and/or replace overly excessive clauses with the model consultation term, subject to it being satisfied that the agreement did not undermine managerial prerogative in essential aspects of the business. These issues warrant investigation not immediate implementation.

⁷³ *Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia v QR Limited* [2010] FCA 591, 11 June 2010, at 44 and 45; *Construction, Forestry, Mining and Energy Union v BHP Coal Pty Ltd* [2016] FCA 1009, 26 August 2016, at 60; *Construction, Forestry, Maritime, Mining and Energy Union v BHP Coal Pty Ltd* [2020] FWC 4322, 20 August 2020, at 212.

⁷⁴ For example, in *Construction, Forestry, Maritime, Mining and Energy Union (105N) v Anglo Coal (Capcoal Management) Pty Ltd* [2022] FWC 3043, (8 November 2022) where Anglo Coal had the prerogative to change employees’ rosters at short notice but still had to provide the agreed allowance of \$300 per changed shift.



Recommendation 7.15 Limit restrictive enterprise agreement content

The Australian Government should limit the ability for enterprise agreements to restrict productivity enhancing changes to technology or workplace practices that are best left to managerial prerogative by:

- leaving employers and employee representatives free to develop mutually beneficial consultation clauses in enterprise agreements, but amending section 205 of the *Fair Work Act 2009* (Cth) so that the model consultation term (as currently prescribed by Schedule 2.3 of the *Fair Work Regulations 2009* (Cth)) would be the only legally enforceable consultation term in an agreement if there was a dispute
- exploring a mechanism that enables the Fair Work Commission to specifically authorise an alternative enforceable term or limit an excessive term.

Recent changes to the Fair Work Act

The *Fair Work Legislation Amendment (Secure Jobs, Better Pay) Act 2022* (Cth) ('the 2022 Amendments') introduced a suite of changes to the workplace relations system, including significant changes to remove some restrictions on multi-enterprise bargaining and the BOOT, and providing more powers to the FWC to intervene in protracted bargaining rounds. The full effect on bargaining and the broader economy from the 2022 Amendments will only be felt several years from now when most existing agreements have lapsed. On top of that, many aspects of the 2022 Amendments provide room for interpretation and discretion by the FWC, which may also require case law to be built up to fully assess the impact of the changes.

Multi-enterprise bargaining

Potentially the most significant of the changes to bargaining stemming from the 2022 Amendments are the measures taken to increase the availability of multi-enterprise bargaining. Previously, the FW Act allowed employers to engage in multi-enterprise bargaining if two or more employers agreed to bargain together. All employers (bar those in the low-paid bargaining stream) needed to have voluntarily participated in the multi-enterprise bargaining process as the FWC was restricted from implementing bargaining orders⁷⁵ to force employer participation other than if a low-paid bargaining authorisation was in effect. Employees participating in these bargaining processes were also unable to undertake protected industrial action. Given this and the complexity and narrowness of its features, multi-enterprise agreements accounted for just 0.5% of all current agreements in September 2022 (DEWR 2022).

Multi-enterprise agreements may increase under the 2022 Amendments. They removed many of the restrictions on the single-interest bargaining stream and the supported bargaining stream (previously the low-paid bargaining stream) and opened up the eligibility requirements into these streams to potentially include many more employers. Further changes include allowing employees bargaining under these streams to take protected industrial action, and the new (or enhanced in the case of supported bargaining) ability of the FWC to make an authorisation that forces employers to participate in multi-enterprise bargaining or be added to an existing multi-enterprise agreement.

⁷⁵ Under the FW Act, if a majority of employees wish to pursue an EA and the employer has not yet agreed, an employee representative can apply for a majority support determination that requires the employer to commence bargaining. If the employer refuses to participate, the employee representative can seek a bargaining order to require the employer to meet the good faith bargaining requirements.

The revamped single-interest bargaining stream has removed limitations on access to multi-enterprise bargaining to, 'support employers with clearly identifiable common interests to bargain together under a single interest employer authorisation in certain circumstances' (Australian Government 2022 p. xiii). The certain circumstances involve employers that are one of the following:

- related employers — those that are engaged in a joint venture, common enterprise or are related bodies corporate
- franchises
- common interest employers — those that have identifiable common interests, which may include similar geographical location, regulatory regime or reasonably comparable operations and business activities.

The supported bargaining stream includes similar requirements for employers with a common interest but is focussed on low-paid industries where 'employees and employers who may have difficulty bargaining at the single-enterprise level' (Australian Government 2022 p. xii). The main difference between the supported and single-interest streams is that through the supported bargaining stream, the FWC has additional powers to assist parties in coming to an agreement such as third-party arbitration.

Multi-enterprise bargaining *may* produce some benefits. It could, for example reduce transaction costs for some smaller enterprises, enabling them to take advantage of any economies of scale in bargaining, sharing the burden and resource intensity of bargaining across employers. Many small to medium-sized businesses do not have the internal capacity or prior knowledge to negotiate agreements and navigate the complexities of the bargaining system, which is why they rarely form EAs. Overcoming the barriers to entry to agreement making could enable more employers to draw on existing EAs and rely on the more sophisticated workplace relations capabilities and resources of larger enterprises to achieve flexibilities and productivity enhancing clauses, without having to go through the process entirely by themselves.

The new provisions may also improve the overall bargaining position of employees, allowing them to achieve more favourable conditions and wages (at least in the short run).

Nonetheless, the new multi-enterprise arrangements pose some risks that could constrain productivity growth and hence the scope for enduring real wage rises over time. As discussed above, the intent of enterprise bargaining is to develop bespoke agreements that take into account the market context and goals of a business and gives employers and employees options for 'win-win' improvements. Forcing unwilling employers or employees into multi-enterprise agreements in which they had no bargaining role may limit these shared productivity and other benefits. This may not just affect individual employers, but employees too may relinquish beneficial changes in working arrangements or higher wages.⁷⁶

Given that industrial action is the most important source of leverage for employee bargaining, the overall level of industrial disruption may also increase. Stoppages reduce the output and productivity of the businesses affected and have flow-on effects through disrupted supply chains. And while cultural attitudes, institutions and laws that underpinned industry-wide determination of wages and conditions have changed over time, and the high levels of industrial disputation observed in the 1980s have largely disappeared (PC 2015c, pp. 859–865), these developments occurred in the context of gradual moves towards a more flexible workplace relations system.

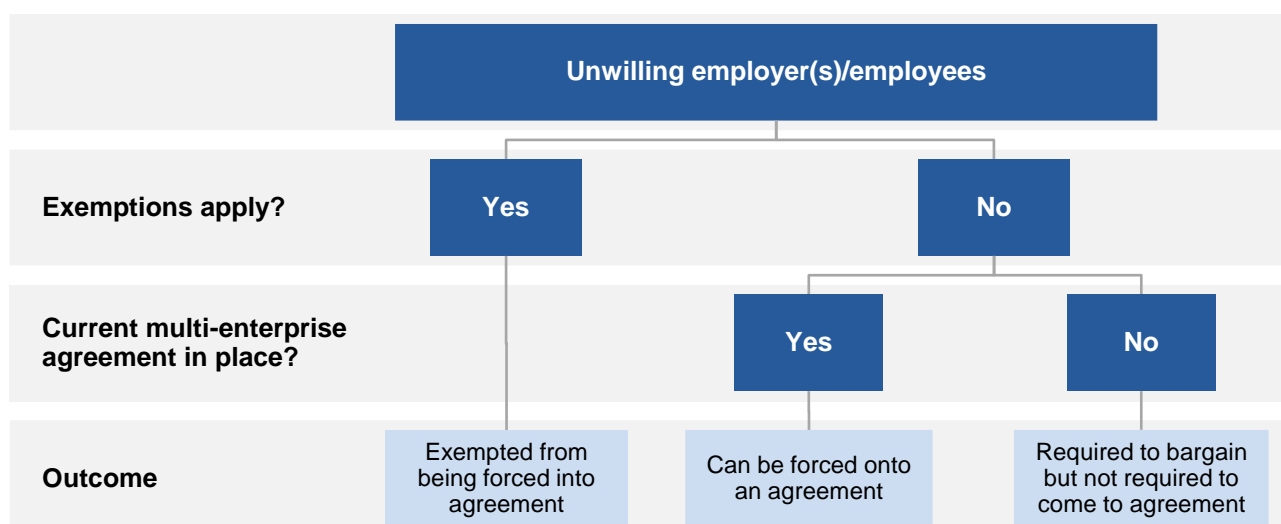
The biggest concern would be if multi-enterprise agreements became industry-wide agreements with the rigidities and risks to productivity and competition that these could entail (discussed in volume 3).

⁷⁶ In principle, businesses could sidestep the inflexibility of multi-enterprise bargaining and negotiate individual flexibility agreements for relevant employees — but this would likely involve significant transaction costs.

The 2022 Amendments include some exemptions and other safeguards that constrain protected industrial action during a multi-enterprise bargaining process and the capacity for the FWC to force unwilling employers or employees to participate in bargaining (figure 4.5). These relate to:

- **business size** — businesses with less than 20 employees (excluding irregular casual employees) are exempt from single-interest bargaining orders⁷⁷
- **current bargaining experience** — any employer that has a current single-enterprise agreement or is currently engaged in a single-enterprise bargaining process is exempt from forced single-interest authorisations.
- **industry** — businesses with employees in the general building and construction industry are exempt
- **previous bargaining experience** — an employer with previous experience of effective bargaining with its employees can be exempted from single-interest bargaining
- **the public interest** — the FWC must consider whether multi-enterprise bargaining is in the public interest, even where all parties are willingly seeking to bargain together
- **the requirement to bargain in good faith** — this requirement does not require a bargaining representative to make concessions or to reach agreement on the terms of a proposed EA (as per s.228(2) of the FW Act).

Figure 4.5 – Potential outcomes in the single-interest bargaining stream with an unwilling bargaining party^a



^a Exemptions include: employers with less than 20 employees, employers without a common interest, employers with a single-enterprise agreement in place, employees and employers in the general building and construction industry, employers and employees with previous experience of effective bargaining, multi-enterprise agreements that fail a public interest test.

Source: *Fair Work Legislative Amendments (Secure Jobs, Better Pay) Act 2022 (Cth)*.

These only partly address concerns about multi-enterprise agreements. While the first three safeguards unambiguously identify the employers exempted from bargaining orders, the FWC must exercise its discretion in relation to the other safeguards. Without established case law to draw from in these matters, it is not possible to judge whether the safeguards have their intended impact.

Moreover, while a bargaining representative is not required to reach an agreement, at the very least, employers would incur the costs of participating in the process (and even higher costs if industrial action was

⁷⁷ This makes at least 93.7% of employing businesses exempt as they have less than 20 employees, noting that additional businesses may also be exempt if they have more than 20 employees, but some are irregular casual employees. (ABS 2022, *Counts of Australian Businesses, Including Entries and Exits*, July 2018 – June 2022, Cat. no 8165.0).

taken). To the extent that participating in bargaining entails significant fixed costs, this could disproportionately affect medium-sized businesses with fewer resources to devote to compliance. And ultimately much or all of these costs would be passed on to consumers.

Bargaining efficiency related changes

The 2022 Amendments also changed the BOOT and gave the FWC more powers to intervene during prolonged bargaining rounds — changes that, in principle, will improve the efficiency of bargaining processes (both single- and multi-enterprise bargaining) and the potential for them to improve productivity.

The amendments make clear that the BOOT is a global assessment, not a ‘line’ by line’ assessment. The amendments also require the FWC to give primary consideration to common views of bargaining representatives when applying the BOOT. Together these enhance the capacity for beneficial trade-offs in agreements that amend award conditions. The FWC will also now have the ability to directly amend proposed EAs that fail the BOOT to make them compliant, avoiding the slowness and complexity associated with accepting (negotiated) undertakings by employers.

The 2022 Amendments have also sought to address the uncertainty in previous iterations of the FW Act about the application of the BOOT to current and prospective employees and to hypothetical working arrangements that might never realistically be envisaged. The FWC may now only consider patterns or kinds of work, or types of employment, if they are *reasonably* foreseeable at the test time.⁷⁸ This overcomes the far-reaching scope of the previous BOOT in relation to future employees. The new form of the BOOT would still be likely to avoid the problems apparent in *CFMEU v One Key* (box 4.7) in which an employer strategically sought to circumvent the BOOT by forming an agreement that, while meeting the needs of existing employees could adversely affect future employees.⁷⁹ Overall, this change should, at the margin, increase the attractiveness of enterprise bargaining, particularly for businesses reliant on, or close to, award conditions, while maintaining the role of the FW Act in avoiding conduct that harms employees.

The provision in the Amendments that give the FWC the capacity to short-circuit prolonged bargaining also could increase the attractiveness of bargaining. Previously, the FWC had only limited options to intervene. The 2022 Amendments allow bargaining parties that have not successfully reached an agreement within nine months to request that the FWC resolve any matters on which agreement has not been reached. The FWC is empowered to do so if there has been a resolved bargaining dispute regarding the disagreement and it is satisfied that there is no reasonable prospect of an agreement being reached without intervention. The main risk associated with this approach is that it might inadvertently lengthen some negotiations if a bargaining party believes that it might get a better outcome from waiting until nine months has elapsed. Whether this concern materialises should be examined as part of the proposed review (recommendation 7.16).

⁷⁸ As an illustration of the change, the explanatory memorandum indicates that an allowance for ‘*the holding of a liquor licence and work in a cool room, despite the enterprise not serving liquor or having a cool room*’ would no longer be a relevant matter for the BOOT, as the hypothetical working arrangement would not be reasonably foreseeable (Australian Government 2022 p. 5).

⁷⁹ The capacity under the 2022 Amendment for the FWC to re-test a previously approved EA against the BOOT should a future employee prove to be worse off than the award provides additional security for employees while encouraging employers to look closely at the terms of an agreement that might trigger such a subsequent intervention. The concerns relating to so-called Zombie agreements, which can preserve conditions well below the award (as occurred in *United Workers' Union v Hot Wok Food Makers Pty Ltd* [2022] FWCFB 191, 21 October 2022) will also be addressed, with such agreements being terminated in December 2023 unless provided an extension by the FWC.

Box 4.7 – CFMEU v One Key

In 2015, One Key, a labour hire business, formed an EA with only three employees. The agreement allowed for variations in 11 modern awards. However, on the day of the vote, no employees fell within the coverage of most of those modern awards (Ellery 2017). The EA sought to pass the BOOT by providing an allowance of 0.1% of the hourly base rate of pay in the relevant award, paid on ordinary hours only. For the three relevant employees, the changes appear to have met the BOOT. The FWC approved the EA.

However, One Key then expanded its staff to more than 1000 employees within six months of the vote, who may not have been better off. The CFMEU, which was not aware of the agreement prior to it being struck, applied to the Federal Court of Australia for it to be quashed or declared void (Ellery 2017).

The Federal Court ruled that there was no genuine agreement from employees as One Key did not take reasonable steps to explain the terms and effect of the agreement, and in particular the interaction that the agreement would have with the 11 awards that would cover future employees. Moreover, Justice Flick observed that the business ‘unquestionably’ secured consent to the agreement with the ‘intent’ to subsequently cover other employees and thereby preclude a genuine bargaining process or any industrial action during the period of the agreement (para 124 of [2017] FCA 1266).

Consequently, the decision by the Fair Work Commission to approve the agreement was overturned and the agreement was deemed to be invalid. The case highlights the importance of maintaining checks and balances in the FW Act to reduce potential gaming by any bargaining party.

Source: *Construction, Forestry, Mining and Energy Union v One Key Workforce Pty Ltd* [2017] FCA 1266, 8 November 2017.

Issues for examination by the proposed review

The 2022 Amendments include a requirement for a review of the operation of the amendments within two years. Among other aspects, the review should test the impacts of the amendments on bargaining processes, the trend in the uptake of EAs and productivity-enhancing provisions in agreements. Similarly, the review will need to assess the overall outcomes of multi-enterprise agreements on the community. Box 4.8 specifies some of the detailed questions that the Productivity Commission considers should be the central focus of the review. The review will need to recognise that two years may not be sufficient to test all of the impacts of the amendments, especially as case law about any contested parts of the legislation may not be fully developed.

Box 4.8 – Considerations for a review of bargaining changes

An effective review of the *Fair Work Legislation Amendment (Secure Jobs, Better Pay) Act 2022* (Cth) (‘the 2022 Amendments’) should examine how the changes to bargaining have affected the bargaining process and its use, the role of the Fair Work Commission (FWC) and the impacts on employers, employees, wages, productivity and broader economy.

Single-enterprise agreements

The 2022 Amendments seek to encourage single-enterprise agreements (Australian Government 2022b, p. 5). The review should consider the ease at which bargaining parties are able to create, implement, and

Box 4.8 – Considerations for a review of bargaining changes

vary (if necessary) single-enterprise agreements to determine if there are complexities that still remain that need to be addressed further.

Key questions

- To what extent have the 2022 Amendments increased the use of current single-enterprise agreements?
- Has there been efficiency improvements in the bargaining process and increased use of productivity-enhancing clauses?
- If the Amendments have not achieved these outcomes, what have been the obstacles and how can they be overcome?

Multi-enterprise bargaining

Given the greater scope for multi-enterprise bargaining under the 2022 Amendments, and its potential economic impacts, the review should examine the uptake of multi-enterprise bargaining and any impacts on productivity, wages, prices and competition.

Key questions

- To what extent have the changes to the single-interest and supported bargaining streams increased the voluntary use of multi-enterprise agreements?
- Are the exemptions to bargaining orders effective in restricting any negative impacts that multi-enterprise bargaining has on productivity, prices and competition or are there grounds for further (or reduced) limitations?
- Is the supported bargaining stream effective in encouraging new participants in the bargaining system and benefiting low-paid workers?

The role of the Fair Work Commission

Many of the 2022 Amendments provide the FWC with increased powers to make determinations while also allowing the FWC to exercise discretion when determining the precise limits for exclusions. The review should examine the effectiveness of the FWC's decision-making processes and results in light of their increased power and influence.

Key questions

- How has the FWC's decision making (and resulting body of jurisprudence) aligned with the intent of the 2022 Amendments and is there a need for more explicit direction in the legislation?
- Has the FWC's decision making in relation to the 2022 Amendments been consistent across all Members?
- Does the FWC have the appropriate capabilities to assess the potential competition impact of multi-enterprise bargaining or is there a need to amend the *Competition and Consumer Act 2010* (Cth) to allow the Australian Competition and Consumer Commission to have a role?



Recommendation 7.16 **Review of recent bargaining changes**

The review of the *Fair Work Legislation Amendment (Secure Jobs, Better Pay) Act 2022* (Cth) should particularly focus on the:

- degree to which it has promoted single-enterprise bargaining and achieved productivity-enhancing improvements in workplaces
- use of multi-enterprise bargaining and its effect on wages, prices, competition, and productivity
- potential need for further clarification on elements reliant on the Fair Work Commission's discretion.

Future directions for bargaining reform

While the 2022 Amendments seek to address some key inefficiencies in the bargaining process, there is still scope for further reforms to increase the productivity gains from bargaining.

Workplace relations culture

Bargaining between employers, employees and their representatives is more the outcome of the culture of any business than legislative provisions. To some extent, such cultures can be affected through education — such as the FWC's Cooperative Workplace program (FWC 2023), but the broader economic and social environment is also key. That culture is affected by the regulatory environment, but also the willingness of governments, regulators, unions and employer peak bodies to co-operate for changes that promote a resilient economy and productivity — as evidenced briefly by (ultimately failing) co-operation during the early stages of the pandemic (Hamilton sub. 50, p. 37, O'Neil 2021).

The key point is that legislative change of the kind proposed in this review is just one ingredient to reform of enterprise bargaining and of the award system, and can only do so much.

Reforming the relationship between agreements and awards

By explicitly defining the BOOT as a global test, the 2022 Amendments have clarified that an EA passes the BOOT if a reduction in one benefit in an award is fully compensated by some other new benefit.⁸⁰

However, the 2022 Amendments do not significantly alter the BOOT. Consequently, it retains many of the complexities and problems that have emerged in past FWC decisions relating to its application. In particular, the BOOT retains the requirement that each and every employee must be better off than the award under a proposed agreement.

On face value, it appears that the test would not necessarily fail if one or a few employees were worse off so long as the class to which such employees belonged were made better off (s.193A(7)).

However, there are two drawbacks to this provision:

⁸⁰ This report does not consider the application of the BOOT to the individual flexibility provisions of modern awards and agreements, which involve a mix of parallel and unique issues.

- It only applies if there is no evidence to the contrary. Accordingly, if a few employees, or just one, could show they were worse off, then the BOOT would fail.⁸¹ Passing a BOOT where a few employees are worse off relies on either inaction or ignorance by the relevant employees or their representatives.
- Classes of workers are a slippery concept. In particular, if a given worker is worse off than someone else in their same class, their working patterns and entitlements must be different. If they are different, then that arguably defines them as a separate class, and the BOOT may still fail.⁸² It is difficult to determine classes given this, and doing so becomes increasingly difficult for smaller businesses with a wide mix of employees. The selection of classes requires the agreement to affect each member in the same way such that there is likely to be a common BOOT outcome.

As it happens, it probably does not matter much that a BOOT could fail for just one or a few employees (existing or genuinely prospective) because there is an easy remedy by simply changing the relevant EA (in the past through undertakings and following the 2022 Amendments, through unilateral minor modification by the FWC of the offending features of the agreement). Such a change would not be costly to employers given the small numbers of relevant employees. Failing the BOOT in this instance is an immaterial and transient nuisance.

Where the application of the BOOT is most harmful is where there is a *significant number* of employees made worse off, even when *most* are not. In these cases, it may not be possible to amend the agreement to pass the BOOT without forfeiting the gains to productivity and efficiency that underpinned the initial agreement. In that context, as a group, employees may be worse off and so would the employer.

There is an inconsistency between the requirement that EAs must make employees better off than the award and the capacity for the FWC to change awards that can make a significant number of employees worse off. The BOOT takes the award as sacrosanct while the award revision process does not.

Providing flexibility for when the BOOT applies

Through its 'all in, or none in' feature, the BOOT lies on one end of a spectrum of arrangements for determining the distribution of benefits for employees covered by an agreement. At the other end, were there no BOOT, the requirement that an agreement lodged with the FWC must be approved by the majority of voting employees provides protection against weakening award conditions but would not prevent disadvantaging a sizeable share of the workforce. There are a range of models lying between these two ends of the spectrum that may be simpler to implement and allow greater scope for productivity-enhancing flexibilities, while still acting in the interests of most employees.

A middle ground between these two positions would be to expand the circumstances in which the FWC can approve an agreement that does not satisfy the BOOT. The FW Act (s.189) allows the FWC to approve agreements that do not pass the BOOT but only if it is in the public interest *and* there are exceptional

⁸¹ A case in point was of an employee in a bakery who could only work on Sundays and so was made worse off, because of her highly specific working patterns by a new EA that was otherwise generally favourable to its employees. That single exception was deemed enough to fail the BOOT (*Shop, Distributive and Allied Employees Association (006N) v Beechworth Bakery Employee Co Pty Ltd T/A Beechworth Bakery* [2017] FWCFB 1664, 6 April 2017). Similarly, the action that led to the failure of the BOOT for the *Coles Store Team Enterprise Agreement 2014-17* relied on a complaint by one employee, though ultimately the evidence suggested numerous employees would have been made worse off (*Duncan Hart v Coles Supermarkets Australia Pty Ltd and Bi-Lo Pty Limited T/A Coles and Bi Lo* [2016] FWCFB 2887, 31 May 2016).

⁸² In this instance, a class becomes divided into sub-classes which have the same effect in law as a class (*BGC Contracting Pty Ltd* [2018] FWC 1466, 12 June 2018, at 221)

circumstances.⁸³ An expanded criteria should consider the benefits of a proposed EA to employees overall, taking into account the relative impact on any employees that are made worse off (or are in line with award conditions).

Factors that would be relevant include:

- the relative size of the worse-off cohort compared with all employees covered by the agreement
- the significance of the disadvantage that the worse-off cohort would experience compared with the benefits to the better-off employees
- the size of the majority approval vote
- the wider economic benefits of the agreement
- whether the worse-off cohort voted to approve the agreement (as they might if they saw opportunities to change their patterns of work to benefit from the new agreement, or simply saw them as reasonable)
- whether a union(s) was involved as an employee representative and supports the agreement.

A decision to waive the BOOT would leave the FWC to decide on the weight it gives to each element, as currently occurs when considering changes in awards based on the modern awards objective. This would include deciding the value of the parameters in the first three criteria that would be relevant to a decision — such as the explicit required size of the majority approval vote (e.g. 90%). This would involve judgment supported by evidence and a careful assessment of the lessons from economic theory, on top of the lessons from the accumulation of case law.

Further safeguards could be explored such as allowing post-approval re-testing or re-voting if certain conditions are met, such as if the majority of employees (or class of employees) covered by an agreement did not originally vote on the agreement. In these circumstances future employees could have an agreement directly amended (or terminated) by the FWC to bring conditions back to award level.

When determining the appropriate mechanism to allow the sidestepping of the BOOT, there should be regard to whether undesirable outcomes as identified in *CFMEU v One Key* (box 4.7) could be repeated. Any new approach would also need to deal with the complexities that were apparent in *Hart v Coles*. In that case, Coles and the Shop, Distributive and Allied Employees Association had mutually agreed to higher hourly base rates and longer meal breaks, among other provisions, in exchange for lower penalty rates (in the *Coles Store Team Enterprise Agreement 2014–17*). These changes largely benefitted permanent employees working weekdays but highly disadvantaged employees working nights and weekends. The provisions of the FW Act made it straightforward for the FWC reverse its approval of the agreement in 2016.⁸⁴ A new arrangement would have to weigh up whether the total benefits to permanent employees working weekdays exceeded the losses to other employees, taking into account the distribution of the losses amongst those affected and their vulnerability.

In the event that this broader approach is not adopted, then alternative options would be to:

- define classes that are broader in their characterisation (such that idiosyncratic working patterns within employee classifications would not constitute their own class). A BOOT would require that the average outcomes for broadly agreed classes from a change in an agreement be better off overall
- move from a BOOT to a 'no disadvantage test', such that a proposed agreement would fail if it disadvantaged a class of worker compared with the relevant modern award. The difference is slight because an obligation to be somewhat better off (say, one cent more per year in wages due to an agreement) is very close to not being disadvantaged (no increase or decrease in wages). Nonetheless the

⁸³ s.189(3) specifies the exceptional circumstances to be where the agreement is part of a reasonable strategy to deal with a short-term crisis in, and to assist in the revival of, the enterprise of an employer covered by the agreement.

⁸⁴ [2016] FWCFB 2887.

change ‘could be a symbolic difference that may incline FWC members to treat the BOOT as setting a slightly higher bar’ (PC 2015c, p. 695).

Changes to the BOOT to increase flexibility could also make the bargaining system more attractive for the subset of workplaces whose wages and conditions are largely determined by awards, and could thereby allow greater scope for productivity and efficiency improvements.



Recommendation 7.17 Disentangle enterprise agreements from awards

The Australian Government should explore methods to further loosen the relationship of enterprise agreements with awards when there is genuine agreement between employees and employers. This should include an amendment to the Better Off Overall Test such that even if some employees are worse off from a change in an agreement, the Fair Work Commission could nevertheless approve an agreement if a range of public and private interest tests were met, including the degree to which the benefits to winners are larger than the losses to losers.

Any changes should have adequate protections in place to avoid undesirable outcomes as exemplified by the *Construction, Forestry, Mining and Energy Union v One Key Workforce Pty Ltd* case.

Proposals from stakeholders

The Business Council of Australia (sub. IR181, pp. 14–15) and the Ai Group (sub. IR179, p. 9) both proposed further reform in the bargaining process by simplifying the requirements on employers to explain the terms of a proposed agreement as required under section 180(5) of the FW Act. Under this section, employers must take all reasonable steps to explain the terms and the effect of those terms to the relevant employees in an appropriate manner taking into account their particular circumstances and needs. Following the *CFMEU v One Key* case (box 4.7), the FWC has placed more scrutiny on the content and method of the explanation given to employers where previously a signed statement from the employer that an explanation had been given sufficed (Ellery 2017). This has increased the burden on employers to not only follow the explanation requirements but also to provide the adequate evidence when applying to the FWC to approve an agreement.

The Business Council of Australia proposed several options to reduce the costs of section 180(5), including only requiring an employer to explain impacts of a new agreement where they vary from a predecessor agreement and that approval of an agreement by a registered organisation (typically a union) would suffice as evidence that an agreement had been adequately explained to employees (sub. IR181, pp. 14–15). However, while the various proposed simplifications would yield some efficiencies, they increase the risks of inadequate communication to employees and could undermine their capacity for informed voting on any agreement. Notably, as in the case of *Hart v Coles*, there could also be cases where one employer representative supports an agreement that makes employees represented by other parties worse off, and without adequate explanation of the terms, the worse-off employees may be uninformed as to the effect of the proposed agreement.

The issue highlights a more general tension in the design of any element of workplace relations law that the bulk of employers do not seek to circumvent the law, but that a small minority do so. Accordingly, there needs to be a balance between reducing transaction costs for employers and employees, while having sufficient clarity in, and enforcement of, obligations to address misconduct by any party to agreements. If this balance is not achieved, the willingness of employees to depart from award conditions or past ‘safe’ agreements may be undermined, working against the intent of encouraging productivity-enhancing EAs.

5. Platform work and the gig economy

Key points

- ✳ **Platform business models can benefit consumers and some workers, while contributing to productivity through new and more efficiently delivered services. Regulatory challenges associated with platform work should be addressed without unduly constraining its business model.**
 - Many forms of platform work are not directly comparable with employment relationships. Shoehorning platform work into other employment categories would put at risk its productivity impacts and its benefits for gig workers. But improved safety protection and access to dispute resolution are warranted.
- ✳ **The potential for collective bargaining between contract platform workers and platforms is subject to competition law (given that independent contractors are considered small businesses). Under current settings, it is unlikely that such bargaining would occur and result in binding conditions on pay.**
 - Competition exemptions for collective bargaining are conditional on passing the net public benefit test. It is unclear whether higher pay rates to workers are legally considered public benefits or detriments.
 - Platforms have little incentive to bargain with small groups of contract platform workers; large groups of contract platform workers may not pass the net public benefit test needed for a competition exemption.
 - As platform workers are paid for what they individually produce, they are incentivised to work at their highest productivity. They have little to trade away in collective bargaining, as platforms could unilaterally impose changes to working arrangements, subject to complying with terms in their contracts with platform workers.
- ✳ **For some platforms, current internal dispute resolution mechanisms appear to be opaque and lack due process. There is no effective external avenue for low-cost dispute resolution.**
 - Ineffective resolution arrangements may result in high turnover and poor outcomes for workers. Platform workers face difficulties in resolving disputes because of uneven bargaining power and may face high legal costs when attempting to pursue court-based remedies. Giving the Fair Work Commission the capacity for resolving significant disputes would provide a last recourse option to protect platform workers.
 - Consumer confidence in platforms also relies on assurance that platform operators can manage poor quality service by platform workers.
- ✳ **Some platform work incurs significant risks to worker and public safety. Insurance arrangements vary and in some cases, appear to be lacking.**
 - Where insurance is lacking, the policy response will depend on the extent of risk, feasibility of implementation and the ability to design a financially sustainable scheme.

5.1 Introduction

One of the key labour market developments since the Productivity Commission's Inquiry on the Workplace Relations Framework (PC 2015c) and Shifting the Dial (PC 2017b) has been the growth of platform work — also known as on-demand work, gig work or work conducted as part of the gig economy.

While ridesharing and food delivery platforms (e.g. Uber, DiDi and Menulog) are among the most well-known examples, platform work in Australia now spans many industries, including clerical and data entry, creative and multimedia, health care, sales and marketing, software development and professional services (McDonald et al. 2019, p. 38). Within transport — the pioneer sector for platform work — there have been further inroads into package delivery and freight services, such as Amazon Flex and Uber Freight (the latter not yet operating in Australia), as well as small goods delivery.

There is a dearth of publicly available data on platform work generally (box 5.1) including on the number of platform workers in the labour market (and given the rapid evolution of this type of work, statistics age quickly). Estimates from 2019 suggested that about 250 000 people were working at least part time in this part of the labour market (Freudenstein and Duane 2020, p. 11). While this is relatively small, this number represents a tripling in the size of the workforce since 2015 and would have made the 'gig economy' a bigger employer than the mining sector at the time, although many people in the 'gig economy' would not work comparable hours.

While platform work involves some challenges for workplace relations policy (section 5.3), it promises significant productivity and other efficiency benefits from better matching between consumers, greater flexibility, higher quality on-demand services and gains in efficiency from more competition between firms (section 5.2). Although there are legitimate concerns about some aspects of platform work, the policy response should not seek to classify all platform workers as employees and risk reducing key productivity benefits, including labour flexibility. Rather, a proportionate approach to addressing genuine issues in platform work would focus on addressing issues including:

- internal and external dispute resolution processes (as relates to suspensions, terminations and non-payment for work) (section 5.4)
- safety issues and insurance arrangements (section 5.5).

What is platform work?

There is no standard definition of platform work, or what the 'on-demand' economy comprises. Many definitions emphasise the exchange of labour where producers and consumers are matched using a digital platform — a website or app — and where payments are generally incurred per task.⁸⁵ For example, the ABS defines digital platform work as:

the provision of fixed duration labour services, in the form of tasks/jobs which are accessed by the worker through digital platforms and are paid per unit of work delivered through the same platform. (ABS 2022e, p. 4)

⁸⁵ This chapter explicitly excludes digital platforms or digital marketplaces in which users sell or rent goods to consumers (e.g. AirBnB, Facebook Marketplace and Gumtree) and is distinct from the ACCC's use of the term 'digital platform' to refer to internet search engines, social media services, online private messaging services, digital content aggregation platform services and some electronic marketplace services.

Box 5.1 – Public data sources on platform work

Publicly available information on platform work is generally irregular, ad hoc and of variable quality. Some data is not directly comparable, as different definitions of when a worker is ‘working’ are used — such as the cumulative time a worker is actively completing a task (‘engaged time’) or to also include the time when a worker is logged in, searching for work — such as in ridesharing or food delivery — but has not found a task yet.

There would be value in more regular collection of detailed data on platform worker outcomes alongside other labour statistics and work health and safety outcomes, especially as the relevance of existing data quickly ages. The ABS has developed a new survey module on digital platform work and workers to be run from July 2022, with initial data expected to be published in the second half of 2023 (ABS, pers comms, 5 September 2022). The ABS also publishes the Work-Related Injuries Survey every four years, covering all workers, though has high sampling errors (Safe Work Australia 2021a, pp. 39–40). Safe Work Australia (pers comms, 12 Dec 2022) also collects data on platform delivery drivers who were fatally-injured at work.

Aside from information published by interested parties, the main source of information about platform work is a 2019 national survey commissioned for the Inquiry into the Victorian On-Demand Workforce (IRV 2020, p. 31), though published results exclude some important dimensions of platform work, such as distribution of hours worked and demographics.

The Household Income and Labour Dynamics in Australia (HILDA) survey has also included information about platform work, starting from 2020, though its reliability is limited by the underrepresentation of recent migrants in the survey’s sample and by sample size (Melbourne Institute 2021). Survey responses to platform work are also incomparable with other labour market questions because of a mismatch in reference periods.

In the future, transaction data provided to the ATO will allow the size of the gig economy to be better measured. Following the *Treasury Laws Amendment (2022 Measures No. 2) Act 2022* (Cth), some platforms will be required to directly report platform worker payments to the ATO for data matching. Required reporting begins on 1 July 2023 for ridesharing and short-term accommodation and on 1 July 2024 for all other reportable transactions.

Other sources include submissions, public hearings and responses to questions on notice relating to various government inquiries about platform work, including those held by the Senate, NSW Senate and the Victorian Government.

The United Nations Economic Commission for Europe defines ‘digital platform employment’ as:

... employment performed through an online tool or an app that matches supply and demand for employment, strongly based on an algorithm. An important aspect to consider in this context is that digital platform employment is about the assignment of individual tasks (smaller or larger), rather than about jobs. Although many platforms treat workers as independent workers, all status in employment categories are potentially relevant to digital platform employment, and classification depends on the nature of economic risk and authority experienced by workers in relation to the platform. (UNECE 2022, p. 40)

Most platform workers are classified as independent contractors (employer-employee models of platform work are rare). Many types of platform work are, in essence, a *digitalised* version of existing contracting

work. Contract platform work is characterised by the sharing of commercial risk and the absence of employee entitlements (for example, a minimum pay rate, paid or unpaid leave and workers compensation), although some platforms provide personal injury and public liability insurance.

Some submissions have highlighted the distinction between ‘horizontal’ and ‘vertical’ platforms (Mable, sub. IR152, p. 1; Per Capita, sub. IR162, p. 7). Horizontal platforms provide a marketplace where workers and clients can negotiate on the nature of work, pay rate and where the platform is not directly involved in allocating work to workers (IRV 2022, pp. 9–10). In contrast, vertical platforms directly allocate workers to clients and may set the price (paid by consumers) and pay rate (paid to workers) for services.

Some forms of platform work are characterised by greater platform control over how a service is performed, such as the possibility of account suspension or termination for having a low rating and or by adjusting service fees based on a worker’s level of performance.⁸⁶



Finding 7.6

Digital platforms appear to be expanding quickly, but data is limited

Platform work is rapidly expanding, but poorly defined. There is a lack of publicly available data on the size of the digital platform workforce and the characteristics of its workers. What statistics are available have limitations — including small sample sizes, being from interested parties that do not provide the underlying data or both. The lack of data is an impediment to definitive conclusions about the sector.

5.2 The upsides of platform work

Platform work can enhance productivity through several channels, including better matching, improved consumer choice and more competition between platforms (and traditional businesses) that improve the quality and variety of available services.

Better matching

By reducing search and other transaction costs, the use of the platform technology itself (including algorithms and real-time price signals) has allowed for better matching between suppliers and consumers. Competition from businesses based solely on platform technology has led to diffusion of digital technologies into more traditional businesses: technology used in rideshare and food delivery platforms (matching customers with nearby drivers) are now used in apps in the taxi industry. For instance, instead of searching for an available taxi on a street or telephoning a taxi booking service, apps now allow people to ‘virtually’ hail a ride and time their walk to the curb to match the arrival of the vehicle with the help of GPS tracking, improving the user experience. Real-time price signals — commonly referred to as surge pricing or

⁸⁶ The performance thresholds that lead to account suspension or termination can be opaque and vary between platforms. That said, Uber states that having a low aggregate rating may lead to removal of access from some or all of the Uber platform (Uber 2022d). DiDi states that a low passenger/user rating, high cancellation rate or low completion or acceptance rate may lead to suspension or permanent deactivation (DiDi Australia 2021). DiDi also states that some drivers may be subject to a lower services fee, based on acceptance rate, completion rate and other factors within a given measurement week (DiDi Australia 2022).

demand-responsive pricing — are a common feature of ridesharing and are designed to induce a greater labour supply response to increase the number of drivers (and rides) available.

Greater flexibility and choice for workers

Digital platforms often have lower barriers to entry and exit than traditional employment models, with workers being able to join and leave the platform without traditional hiring processes or (generally) without restrictions on the number of people that can offer their services on the platform. Workers can supply labour without a hiring and rostering process, often bringing their own equipment. For instance, many rideshare drivers use their own car, although some drivers enter into financing or rental agreements specifically to work in ridesharing.

The platform model has facilitated the entrance of many additional suppliers in markets such as urban transport, providing greater consumer choice. In particular, Uber has rapidly increased its patronage compared with taxi services (Roy Morgan 2019). Uber itself is now facing stiffer competition from rivals like Ola and DiDi (Roy Morgan 2020). The competitive pressures are greater than might seem apparent by just considering the number of platforms because platform workers on the same platform compete with each other. The overall growth of non-employing businesses offering taxi and other road transport services, which will include many rideshare drivers, provides a rough measure of rising competitive pressures (figure 5.1).⁸⁷ In ridesharing, labour flexibility has allowed platforms to address labour shortages and improve worker retention by giving workers time-limited bonuses or temporarily higher pay rates (Rana 2021).

There is variation in each platform's level of control over its workers. Many platforms offer workers the flexibility to choose when they work, allowing them to choose the day of the week, time of day, and duration of their shifts, often only setting maximum shift hours for safety reasons. In practice, workers often only work during times of high demand (e.g. food delivery) as the effective hourly rate is otherwise low or are encouraged to provide services during peak times (e.g. surge pricing). Some platforms may require workers to accept work in 'blocks' of hours. There are also platforms that operate solely as a conduit between the consumer and the worker, allowing the two parties to organise the time and duration of work without the platform's input.⁸⁸

Digital platforms offer workers more flexibility in how they provide their services compared with traditional employee-employer relationships. Some platforms allow workers to choose for themselves or negotiate with consumers on how to complete tasks. Platforms tend not to restrict workers from providing services on other platforms, even for competing platforms. However, some platforms may use the acceptance rate of tasks or other inputs as a method of allocating work through algorithms. The nature of platform work in ridesharing and food delivery (involving down time between customers) lends itself to 'multi-apping' where a digital platform worker can offer services and sometimes perform tasks in two or more competing apps at the same time. For instance, a food delivery worker may accept tasks on more than one platform, have multiple deliveries along a route, or both.

⁸⁷ Although a large number of contractors working for the same vertical platform might not compete with each other in the same way a large number of small businesses normally would.

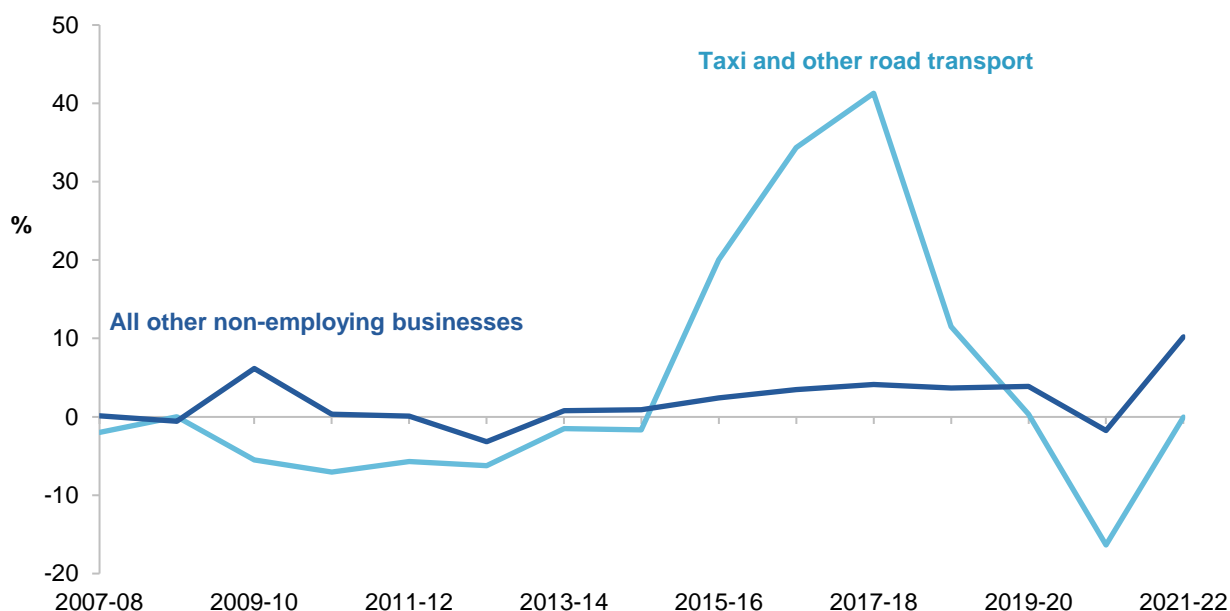
⁸⁸ As platform work operates on a task-by-task basis, most platforms only provide payment to workers at a piece rate via the platform after the task is complete. Some apps have a set rate per task that workers earn based on the pre-determined price of the service to the consumer, while others allow workers to negotiate with the consumer on their price and thus their fee or to respond directly to a consumer's offer. Digital platforms then collect either a share of the consumer price or an additional fee on top of the consumer price. In some cases, the consumer of services is the platform, such as in Amazon Flex, where workers deliver packages for Amazon, and FedEx's proposed platform for delivery (Marin-Guzman 2022).

The low barriers to entry for workers in some forms of platform work can benefit people who find it difficult to access the formal labour market. About 60% of Uber Eats delivery workers found it difficult to obtain jobs as employees (Accenture 2021, p. 12).

Some workers rely on platform work as their main source of income or find that such income is important. About 78% of rideshare drivers and 86% of food delivery platform workers who responded to a Transport Workers' Union (TWU) say that platform work was their main source of income (TWU 2021, p. 10,14), while 57% of Uber Eats delivery workers say that income derived from Uber Eats work was 'essential to them' (Accenture 2021, p. 11). Of course, dependence on platform income need not align with community norms about appropriate wages if a platform worker has no or few outside options.

Figure 5.1 – The number of taxi and other road transport businesses grew significantly from 2014 until COVID-19^a

Percentage change in the number of non-employing businesses



a. Most transport platform workers are engaged on an independent contractor basis and as such require an Australian Business Number. As such, the significant increase in the number of taxi and other road transport businesses since 2014 is likely to be a reflection in the growth of platform work.

Source: ABS (*Counts of Australian Businesses, Including Entries and Exits*, various issues, Cat. no. 8165.0).

Higher quality services

Some digital platforms have underpinned greater consumer empowerment, improving the quality of service. In aged and disability care, platforms allow people to choose individual carers. This reduces people's search costs in finding carers that meet their preferences and that understand their care requirements, without the need to re-familiarise with a new carer. For instance, Hireup — which engages workers as employees — states that on average, the length of a care relationship via the Hireup platform spans 12 months (Hireup 2021, p. 10).

More competition

Platforms have enhanced competition and encouraged competitors to explore different pricing models and structures to attract consumers with different preferences in growing markets (table 5.1). In ridesharing,

real-time fares are typically set by a platform in response to consumer demand, driver supply and to maximise profit. However, some rideshare platforms have departed from such pricing models and some taxi networks use their lack of surge pricing as a product differentiator. For example, InDriver allows for a negotiated fare, where the user proposes a fare and drivers place bids; 13CABS states that there is no surge pricing for taxis in their network. For ridesharing, where there are many platforms and taxi fleets competing, consumers have experienced lower prices (including through discounts and promotions). Some have questioned the sustainability of such pricing in the longer term, given that some new operators are loss-making and underwritten by venture capital (Ryder 2021).

Table 5.1 – Typical differences between contract and employee platform work

	Employer-employee relationship Hireup (aged care)	Independent contractor to platform-branded service Most transport and food delivery platforms	Independent contractor advertising own services on platform Airtasker (misc. tasks) Mable (aged care)
How are workers recruited?	<ul style="list-style-type: none"> Employees are hired by the platform 	<ul style="list-style-type: none"> Workers opt-in subject to meeting platform standards (e.g. own equipment) 	<ul style="list-style-type: none"> Workers opt in to advertise services or accept offers, subject to some set standards (e.g. occupational licensing for Mable)
How are pay and conditions set?	<ul style="list-style-type: none"> Pay and conditions (e.g. minimum wage, loadings and superannuation) at or above relevant award and National Employment Standards 	<ul style="list-style-type: none"> Price and pay rates typically set by platforms, as per contract between platform and worker. Exceptions include InDriver (customer proposed fares) 	<ul style="list-style-type: none"> Workers set consumer price per task or negotiate with individual clients, as per contract between platform and worker
How are working hours set?	<ul style="list-style-type: none"> Employers roster staff or working hours arranged between casual staff and clients Minimum shift lengths for casual workers 	<ul style="list-style-type: none"> Workers choose autonomously when and where to work, subject to safety measures, which may include maximum shift duration 	<ul style="list-style-type: none"> Workers choose autonomously when and where to work, subject to safety measures, which may include maximum shift duration

**Finding 7.7**
Platform business models are efficiency-enhancing

By improving the matching of services to consumers, consumer choice, competition, and the quality and variety of available services, platform work can contribute to productivity growth and have broader benefits for consumers and workers.

People choose to engage in platform work for different reasons, including:

- low barriers to entry where workers have difficulty getting jobs in the formal labour market — some workers use platform work as their main source of income
- autonomy over hours of work — some workers find that attractive pay rates are available for short durations of peak demand, or through multi-apping, or as a supplement to their main source of income
- choice in tasks, where platforms have less control over the type of tasks completed by a worker.

5.3 Regulatory challenges relating to minimum pay and conditions in Australia

As a nascent disruptive business model platform work poses challenges for regulatory frameworks and extant business models. Identifying and dealing with genuine risks to social wellbeing will require nuance and balance to ensure the benefits of the gig economy are not unduly suppressed. The Productivity Commission's Inquiry into Aged Care Employment (PC 2022b) provides an in-depth examination of these regulatory challenges in platform work within the Australian aged care industry.

Much public discussion about platform work, both in Australia and internationally, relates to employment status — whether a worker is an employee or independent contractor — which determines worker rights and entitlements and platform obligations, as relates to minimum pay and conditions, and work, health and safety (WHS) obligations. Independent contractors generally do not have access to employee entitlements (such as a guaranteed minimum wage). In some industries, platforms simply improve the matching process between an independent contractor and consumer for services, leading to better consumer choice with on-demand services. In other industries, such as ridesharing and food delivery, where platforms have a high degree of control over how work is performed and where workers are independent contractors, there may be concerns relating to conditions, work health and safety obligations and dispute resolution, which would need to be carefully addressed.

Internationally, different approaches to the employment status of platform workers have included introducing or modifying legal tests to identify employees and independent contractors or introducing a third, intermediate category of worker between an employee and independent contractor.

The experiences of other countries provide lessons for Australia

Several international jurisdictions have recently regulated the workplace relations aspects of platform work, have had legal test cases clarify some worker entitlements, or are in the process of creating and passing legislation to do so, mainly focusing on ridesharing and food delivery (box 5.2). These various approaches highlight a number of practical issues:

- A codified legal test that determines employment status must be worded carefully. A poorly-worded test may not be specific enough to address policy issues and could be too open to changes in platform

business models to avoid coverage or cause reclassification of employees to other forms of employment or, conversely, could impose excessive regulatory burden or stifle the productivity-enhancing aspects of platform work.

- Introducing a third category of worker could create additional uncertainty about the definitions of employment status for ‘traditional’ employees, independent contractors and platform workers if the codified definition is imprecise.
- Providing universal minimum standards to all (or a defined subset of) platform workers would require that such standards are tractable for those types of work.
- Adopting a status quo approach where legal test cases are used to clarify existing employment legislation would not address policy concerns if existing legislation is not fit-for-purpose or if test cases fail. In some successful cases, test cases may only clarify access to entitlements for a subset of platform workers (as in the United Kingdom example below).

Box 5.2 – Platform work regulation in international jurisdictions

United States

In the United States, policy developments have largely occurred at the state or local level. These include:

- **voter propositions** that definitively classify transport and delivery platform workers as independent contractors. One example is Proposition 22 in California, exempting such workers from California’s employment status test, though it is unclear whether the proposition is constitutional.⁹ Proposition 22 provides a minimum wage when a worker is actively completing a task and provides some liability insurance and personal injury insurance coverage
- **regulating minimum pay and conditions** for ridesharing, food delivery or both. Examples include in New York City, where the minimum payment rates (per mile and minute) account for worker expenses and utilisation, in Washington State for ridesharing (Uber 2022e) and in the City of Seattle for delivery platform workers (Seattle City Council 2022)
- **interpreting existing employment law.** In September 2022, Uber paid US\$100 million to settle a backpay claim relating to unemployment insurance taxes in New Jersey. The New Jersey Labor Commissioner has stated that the settlement means ‘these [Uber] workers in New Jersey are presumed to be employees’ (Metz 2022). However, it is unclear how the settlement will affect worker entitlements or Uber’s future liability.

Some federal departments have also released policy guidance related to platform work and contracting, including the Federal Trade Commission (2022) and the Department of Labor (2022).

Canada

In April 2022, the Digital Platform Workers’ Rights Act, 2022 (DPWR Act) was legislated in the province of Ontario, Canada. The DPWR Act defines digital platform work as the provision of for-payment rideshare, delivery, courier or other prescribed services by workers who are offered work assignment by an operator through a digital platform.

The DPWR Act provides digital platform workers with seven rights:

- information from the digital platform operator, including how pay is calculated, what factors are used to assign work and the consequences of performance ratings, if used
- a recurring pay period and pay day

Box 5.2 – Platform work regulation in international jurisdictions

- a minimum wage
- amounts earned by the worker and tips and other gratuities, and limits to the circumstances in which platforms can withhold pay or deduct from earnings
- notice of removal from an operator’s digital platform, requiring written explanation for removal and platforms to provide notice if access is removed for more than 24 hours
- work-related dispute resolution in Ontario
- freedom from reprisal.

United Kingdom

Policy developments within the United Kingdom has largely occurred within existing law. In February 2021, the UK Supreme Court ruled that Uber drivers were considered ‘workers’, a category separate to that of employees or independent contractors. No new legislation was required to classify Uber drivers as workers that receive these entitlements. Rather, the worker status already existed under UK employment law. In the United Kingdom, Uber is required to provide its drivers a minimum wage and paid leave entitlements, where the minimum wage is calculated during the time that a driver is transporting a passenger.

The ruling does not automatically apply to other platform workers — if drivers on other platforms or food delivery riders believed they should be classified as ‘workers’ they would need to allege misclassification through legal proceedings. For instance, Deliveroo riders are not legally considered ‘workers’ for the purposes of the United Kingdom’s collective bargaining laws, although as of September 2022, an legal appeal to the Supreme Court is ongoing (Criddle 2022).

European Union

In December 2021, the European Commission proposed a Directive to ensure that digital platform workers were granted the correct legal employment status. The Directive involves a rebuttable presumption that digital platforms are considered employers if they fulfil at least two of the following:

- effectively determine or set upper limits for the level of remuneration
- require the platform worker to respect specific binding rules with regards to appearance, conduct towards the recipient of the service or performance of the work
- supervise the performance of work or verifying the quality of the results
- effectively restrict the freedom to organise one’s work, in particular the discretion to choose one’s working hours or periods of absence, to accept or refuse tasks, or to use subcontractors or substitutes, or
- effectively restrict the possibility to build a client base or to perform work for any third party.

The people deemed to be working through these employers would hold the status of ‘worker’ and have the right to a minimum wage (where it exists within a Member Country), collective bargaining, working time and health protection, the right to paid leave or improved access to protection against work accidents, unemployment and sickness benefits, as well as contributory old-age pensions.

The Directive is currently undergoing negotiations with EU Member Countries before legislation is to be introduced (Chee 2022).

a. Proposition 22 passed and was later ruled as unconstitutional (Norton Rose Fulbright 2021). Platforms have followed the regulation specified in Proposition 22 while an legal appeal against the ruling is held (Allsup 2021).

Regulatory challenges relating to minimum pay and conditions in Australia

Like many other countries, most platform workers in Australia are classified as independent contractors rather than employees (exceptions include Hireup, a care platform and Milkrun, a rapid grocery delivery platform).

While the ‘gig economy’ is relatively novel, Australia has long used independent contracting in a number of occupations, including heavy vehicle freight, some health services (GPs and some allied health professionals), and many trades. The value of contracting largely relates to occupations where someone with specialised skills and assets can provide services to many different clients. There are longstanding concerns about the misrepresentation of an employee-employer relationship as that of a contractor (i.e. ‘sham contracting’). The Productivity Commission has previously recommended strengthening regulation of sham contracting — such that the legal definition of sham contracting be changed from one where an employer has ‘recklessly’ made a misrepresentation to a test of ‘reasonableness’ (PC 2015c, pp. 813–815).⁸⁹ The *Fair Work Act 2009* (Cth) (FW Act) continues to set the bar at ‘reckless’ (s. 357(2)).

Platforms have often been introduced into occupations where independent contractors, labour hire and other non-traditional employment arrangements were all relatively common. As such, the introduction of platforms in those occupations have changed the dynamics of work but have not raised questions about the employment status of workers.

Questions remain about fairness, the responsibilities of platforms and the rights of platform workers, particularly at the lower end of the income scale or in occupations that entail physical safety risks. Rideshare and food delivery in Australia tend to involve platforms with ongoing, direct⁹⁰ relationships with individual contractors, sharing *some* similarities with employee-employer relationships. For occupations like food delivery and ridesharing services, platform contractor work can often entail low pay (that is, after costs, pay close to or below the National Minimum Wage) and some elevated level of risk to personal safety, while operating outside the scope of National Employment Standards, awards, and often of any form of bargaining on rates and conditions. For those whose main source of income is made via platform work, further drawbacks may include variable and fragmented hours of demand and the lack of sponsored professional development opportunities. In voluntary administration or liquidation, contract platform workers may be considered unsecured creditors,⁹¹ with low priority in making claims on assets to recover any owed amounts. These are the downside risks associated with any form of self-employment.

In Australia, employment status is determined through the common law

While classifying platform workers as employees would lead to pay, conditions and responsibilities (of platforms and platform workers) consistent with regulatory requirements specified in the FW Act, modern awards and the National Employment Standards, it would necessitate a significantly different business model to those used by most platforms. In some cases, it would remove aspects of platform work that are preferred by workers and that lead to better matching of services to consumers.

⁸⁹ The exact recommendation was also supported by the Australian Government’s Black Economy Taskforce (2017, p. 236).

⁹⁰ While platforms in care services (e.g. Mable) or freelancing and odd jobs (e.g. Airtasker) allow consumers to choose individual service suppliers, the relationship between consumer and worker is less direct in other occupations. For rideshare and food delivery, consumers are more interested in finding the next available worker, rather than choosing, say, the most skilled and qualified delivery person. As a result, platform workers arguably have a more direct relationship with the platform than with customers.

⁹¹ For instance, during Deliveroo’s exit of the Australian market in November 2022 (Ziffer and Janda 2022).

At the time of writing, the common law legal precedent from *Personnel Contracting* and *Jamsek* has established a high threshold for classifying platform workers as employees in rideshare and food delivery in Australia (box 5.3).

Box 5.3 – Australia’s common law approach to determining employment status

In Australia, some platform workers have disputed their classification as independent contractors and have contended that they should have the rights and entitlements of employees. Under Australia’s common law approach, employment status determinations are affected by the precedents set by other legal cases — most recently by *Personnel Contracting* and *Jamsek*, which were heard in the High Court of Australia in February 2022, though these two cases did not involve platform workers.

Legal commentators suggested that the outcomes of *Personnel Contracting* and *Jamsek* gave pre-eminence to the written terms of the contract in determining employment status, when ‘the efficacy of [the contract] not challenged on the basis that it is a sham or is otherwise ineffective under general law or statute’ (Handaya 2022; MinterEllison 2022). Some suggested that the decision was a departure from the High Court’s previous application of the multifactorial test (Power and Selinger 2022). As such, the view was that it would be easier for businesses to engage workers as independent contractors (Longland et al. 2022). For instance, Prof. Andrew Stewart said that:

If you’ve undertaken to do some work on the basis of a comprehensive set of written terms, it’s those terms which will be the basis for determining whether or not you’re an employee or an independent contractor, not the reality of your working arrangements ... That is a big shift. (Hutchens 2022)

Employment status determinations within platform work

Some platform workers have challenged their employment status using unfair dismissal laws after they were deactivated by platforms. Under the national workplace relations system, unfair dismissal laws apply to employees and not to *genuine* independent contractors.

In November 2018, the FWC ruled that a Foodora delivery worker was unfairly dismissed (though Foodora had ceased Australian operations in August 2018). The Fair Work Ombudsman (FWO) had also initiated legal proceedings against Foodora, alleging sham contracting, although the proceedings were later discontinued following Foodora’s cessation of operations (FWO 2019).

In December 2020, it was reported that Uber settled a case with a delivery worker after an appeal by a former Uber Eats driver for unfair dismissal reached the Federal Court of Australia (Marin-Guzman 2021). The appeal to the Federal Court followed a decision by a Full Bench of the FWC in April 2020, which found that the driver was not an employee and therefore not protected by unfair dismissal laws.

In August 2022, a Full Bench of the FWC overturned a previous decision about the employment status of a Deliveroo delivery worker, following an appeal by Deliveroo. (The previous decision, in May 2021, had found that the delivery worker was an employee and unfairly dismissed.) The Full Bench stated that they were bound by the precedent set by *Personnel Contracting* in overturning the previous decision:

As a matter of reality, Deliveroo exercised a degree of control over Mr Franco’s performance of the work, Mr Franco presented himself to the world with Deliveroo’s encouragement as part of Deliveroo’s business, his provision of the means of delivery involved no substantial capital

Box 5.3 – Australia’s common law approach to determining employment status

outlay, and the relationship was one of personal service. These matters, taken together, would tip the balance in favour of a conclusion that Mr Franco was an employee of Deliveroo. However, as a result of *Personnel Contracting*, we must close our eyes to these matters.

Sources: Stewart (2021, p. 81); Marin-Guzman (2021); *Joshua Klooger v Foodora Australia Pty Ltd* [2018] FWC 6836; *Amrita Gupta v Portier Pacific Pty Ltd*; *Uber Australia Pty Ltd t/a Uber Eats* [2020] FWCFB 1698; *Diego Franco v Deliveroo Australia Pty Ltd* [2021] FWC 2818; *Deliveroo Australia Pty Ltd v Diego Franco* [2022] FWCFB 156 (17 August 2022) at 54.

Should platform pay and conditions be regulated?

Most Australian platform workers do not have the legislated minimum pay and conditions that apply to employees that as they are engaged as independent contractors outside of national or state workplace relations systems. Pay rates and conditions for platform workers are affected by market conditions and their contracts with platforms (some platform workers will have more control over pay and working arrangements). The *Independent Contractors Act 2006* (Cth) (the ‘IC Act’) has limited contractor protections, including the ability for contractors to apply to the Federal Court or Federal Circuit and Family Court of Australia to review a contract if there are ‘unfairness grounds’ — one ground being if the remuneration rate is less, or likely to be less, than an employee performing similar work (section 2.4). The provision is rarely used (IRV 2020, p. 171).

A limited set of platform work is subject to existing state workplace relations laws that set minimum entitlements. Amazon Flex drivers in New South Wales are owner-drivers covered under the *Transport Industry — General Carriers Contract Determination 2017* (NSW) and *Transport Industry — Courier and Taxi Truck Contract Determination* (NSW), which includes minimum pay rates by class of vehicle (Wolters Kluwer Australia 2022).

Some platform workers may be eligible for the Victorian Government’s Sick Pay Guarantee scheme, which provides 5 days of sick leave, paid at the National Minimum Wage, for a defined list of casual or contract workers who do not have paid leave entitlements. While rideshare and food delivery platform workers do not appear to be eligible, some aged care and disability support platform workers may meet the criteria (Victorian Government 2023) (Victorian Government 2023). The Sick Pay Guarantee is a two-year pilot scheme, ending in early 2024.

Platforms have expressed varied perspectives on the regulation of pay and conditions. In their agreements with the Transport Workers’ Union (TWU), DoorDash and Uber expressed support for an independent body in Australia that would determine minimum standards (box 5.4). Mable described its operations in aged care as a ‘marketplace’ where parties directly form agreements covering the types of services delivered and the terms — including rates of payment. (sub. IR152, p. 1). Hireup argued that platforms in disability support play a significant role in all phases of a support relationship (including finding clients, arranging shifts, and accessing training and payment) and as such the platforms ‘very much act as employers to their support worker ‘employees’ (sub. IR109, p. 1).

Box 5.4 – DoorDash and Uber agreements with the TWU on principles of regulation

In May 2022, the TWU and DoorDash agreed to advocate for industry-wide standards set by an independent body and agreed to six core principles that should apply to transport platform work. The agreement included to develop a future Memorandum of Understanding and to jointly advocate to policymakers on a preferred policy option (DoorDash 2022). The six principles were that:

- workers should not be prohibited from accessing appropriate work rights and entitlements
- workers must have transparency
- workers must have the opportunity to contribute to a collective voice
- workers must have access to dispute resolution processes
- appropriate resources should be allocated to ensuring industry standards are established and maintained, and to driver education and training
- There should be a three-stage approach towards achieving regulation of the on-demand transport industry.

In June 2022, the TWU and Uber agreed to four principles of regulation about on-demand delivery and rideshare platform workers who are independent contractors. The agreement also included commitments by the TWU and Uber to further discuss the operationalisation of the four principles of regulation, and to discuss, in good faith, industry standards in food delivery and sector standards in other Uber services, such as ridesharing and the delivery of goods.

The principles below are intended to cover on demand delivery and rideshare platform workers in the transport industry who are not engaged as employees. Employees already have entitlements under the Fair Work Act and other legislation ...

The TWU and Uber support the Federal Government legislating for an independent body, or a stream of an independent body, specific to platform work and comprised of (sic) industry experts, with the capacity to:

1. Set minimum and transparent enforceable earnings and benefits/conditions for platform workers based on the principle of cost recovery, taking into account the nature of the work.
2. Facilitate a cost effective and efficient mechanism to resolve disputes such as deactivation of relevant platform worker accounts. Any dispute resolution mechanism must be fit for purpose for platform work.
3. Ensure the rights of platform workers to join and be represented by the relevant Registered Organisation are respected and that platform workers have an effective collective voice.
4. Ensure that appropriate enforcement exists to meet these standards and objectives.

The TWU further stated that it did not support creating a 'third category of worker' in Australia's workplace relations system as it could risk reclassification of employees into the hypothetical third category (TWU, trans., p. 9).

Sources: DoorDash (2022); TWU (2022).

Comparing piece rates to hourly rates can be difficult

It can be difficult to compare hourly earnings between platform work and other forms of employment, particularly if the former involves pay rates per customer, if workers choose their own hours of work, or if there is ‘down time’ between customers. About 40% of platform workers stated that they did not know what they earned from their main platform (McDonald et al. 2019, p. 5).

In rideshare and food delivery, demand often spikes around particular times of day, where prices and demand are higher (for instance, in the evening for food delivery platform work) (figure 5.2). Changes in both the demand for services by consumers and the supply of platform workers will affect pay rates and prices (which are set by the algorithm) as well as the share of time that workers spend completing a task compared with being on-call, where a worker is logged on but does not have a task. As such, for workers, per-customer pay rates not only cover the time and effort required for fulfilling the service, but also waiting for a task offer and travelling to the pick-up point.

These complexities mean that it is impossible to determine the pay rate for platform work (on a per task basis) that would always be commensurate with the award for employees in similar work. Conversely, if comparisons are made in terms of hourly income, assumptions would need to be made about reasonable waiting times or travel to pick-up points. This context is relevant to determining whether (and if so, how) pay should be regulated for rideshare, food delivery, and some forms of task-work. The treatment of down-time and time spent travelling to pick-up points would be crucial. It would be more straightforward to design any stipulated minimum pay rate for rideshare, food delivery, and other task-based work on a per-task basis, but to consider what typical downtime may look like per hour (or other unit of time).

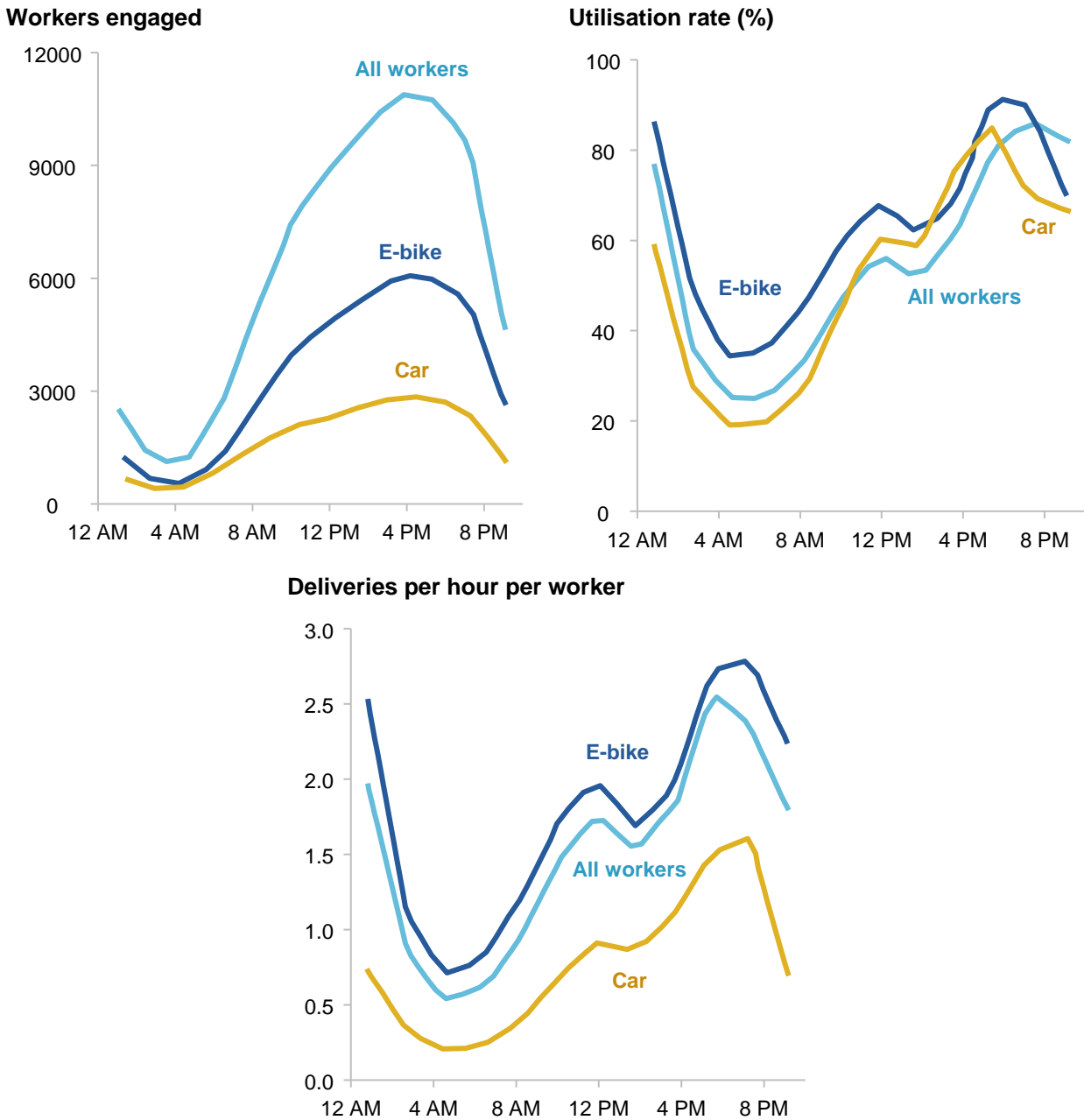
For instance, for ridesharing, it may also be necessary to design incentives such that drivers would not be rewarded for extending waiting times, or for choosing to drive in off-peak times where demand is low. In New York City (NYC), high-volume ridesharing platforms — including Uber and Lyft — are required by law to pay drivers a minimum rate per mile and minute, which considers expenses incurred as a driver, as well as the average time spent without a passenger for a given platform. However, platforms can still set pay rates to drivers above the floor (for instance, if there is high demand from consumers).

The New York City Taxi and Limousine Commission determines minimum pay rates for high-volume ridesharing platforms using administrative data provided by platforms to account for time where a driver is waiting for a trip offer. When the policy was introduced in 2018, the minimum pay rates — calculated per mile and per minute when a driver is transporting a passenger — were intended to result in an hourly wage of about US\$15 per hour after costs (New York City Taxi and Limousine Commission 2018, p. 3).⁹² That said, more than 60% of rideshare drivers in NYC work full-time hours (providing about 80% of rideshare trips in NYC) (Parrott and Reich 2018, p. 3) — only 14% of Uber drivers in Sydney worked more than 30 hours per week in 2017-18 (AlphaBeta 2019, p. 16)⁹³ — and there are geographical differences between NYC and Australian cities.

⁹² In 2018, New York City’s minimum wage for large businesses was US\$15 per hour.

⁹³ Although this may be an underrepresentation of the number of hours worked by rideshare drivers if there is a high level of multi-apping.

Figure 5.2 – Food delivery platform activity is highly time-dependent^{a, b}
Activity on food delivery platforms in New York City, fourth quarter of 2021



a. The 'workers engaged' figure is the daily average of workers logged into a platform. The 'utilisation rate' is the share of working time (the time logged into a platform) a worker spends in during a trip, either retrieving food or delivering food to a passenger. The category 'all workers' includes food delivery platform workers using e-bikes, cars, motorcycles and those who deliver on foot. b. New York City data is used as an illustrative example, given lack of Australian data.

Source: NYC Department of Consumer and Worker Protection (NYC Consumer and Worker Protection 2022, p. 16).

Platform worker earning rates vary across industries and occupations

There is a wide dispersion of earning rates across platform workers in Australia (box 5.5).

Box 5.5 – How much do platform workers earn?

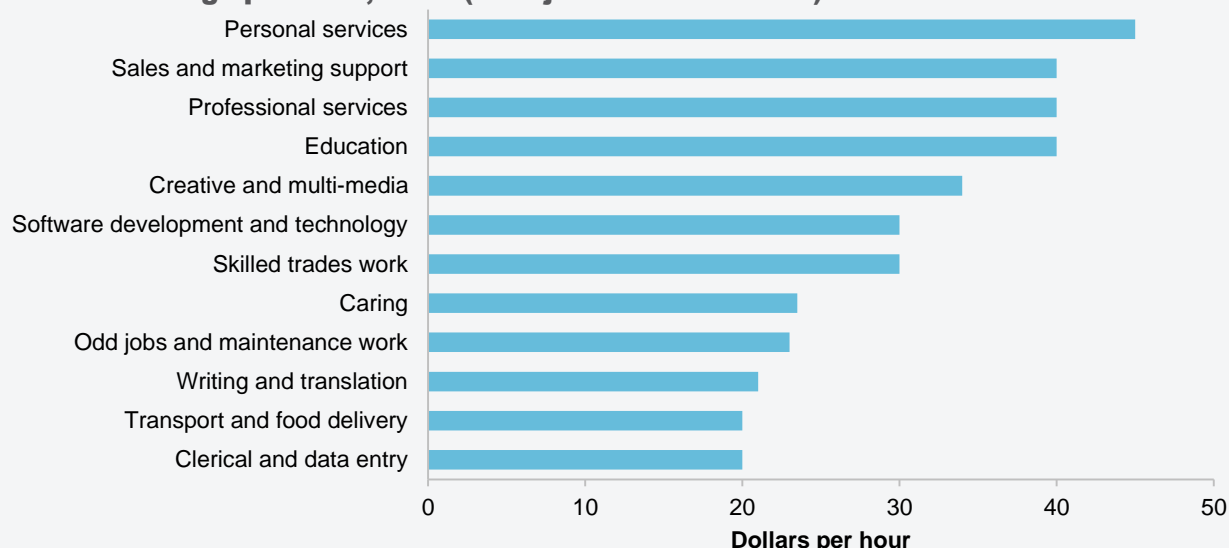
There is significant variation in platform workers' earnings, depending on the type of work completed and industry (figure below). In 2018-19, median wages across different industries varied between about \$20 and \$45 per hour, a high level of dispersion that is also a characteristic of *employee* wages across industries (ABS 2022a).

However, estimates of hourly rates are subject to error and uncertainty. Many platform workers find it difficult to estimate their hourly rate as many are paid per task, rather than an explicit hourly rate (IRV 2020, pp. 37, 55). The estimation of an hourly rate is also complicated by:

- 'downtime' in searching for a job or travelling to and from a job, which is often not paid
- 'multi-apping', where workers are active on two or more platforms and choose the most profitable tasks, is also not collected in platform data, but likely to be considered in direct surveys of workers. This is one area where future ABS data collection may prove helpful.
- the need to subtract costs from gross earnings
- the varying time periods to which estimates relate, which is problematic given the high growth rate of platform work and the dependence of rates on the tightness of the general labour market.

Platform workers' earning rates vary by type of work^a

Median earnings per hour, 2019 (unadjusted for inflation)



a. Estimates from the National Survey are approximate only as it is unclear whether respondents reported gross or net earnings after cost, some respondents may work for platforms in different categories of work, data is categorised by the type of main platform, and the sample size is low (IRV 2020, p. 59).

Source: McDonald et al (2019, p. 43).

Box 5.5 – How much do platform workers earn?

Other data on earnings provide insights into variations between workers and across platforms. The Select Committee on the Impact of technological and other change on the future of work and workers in New South Wales (2022, pp. 18–19) found that (in rounded figures):

- Ola drivers made \$25 or \$26 per hour
- Deliveroo workers made \$10 to \$11 per delivery^a
- Menulog workers made \$11 to \$12 per delivery
- EASI workers made \$8 to \$9 per delivery.

Using administrative data, Sydney Uber drivers on average earned \$21.00 per hour (after costs) in late 2017–2018 (AlphaBeta 2019, p. 20). For deliveries made during high demand periods (defined as ‘mealtimes’ by Accenture), Uber Eats delivery workers who delivered by car earned on average \$20.74 per hour, those by motorcycle \$21.97 per hour and by bicycle \$21.92 per hour, leading to an average take-home hourly rate of \$21.55 (Accenture 2021, p. 3). (An average hourly rate for all hours worked was not reported for Uber Eats.)

Submissions to the Select Committee on Job Security (2021) by platforms and unions provided average hourly earnings estimates between:

- \$12.85 to \$21.00 per hour (after costs) for rideshare platforms
- \$10.42 to \$21.55 per hour (after costs) for food delivery platforms
- \$10.00 (after costs) to \$29.84 (before costs) per hour for parcel delivery platforms
- \$25.00 to \$31.52 per hour for disability and aged care platforms.

One consideration with ridesharing and food delivery is the time spent offering the service, but without a paying customer, and any surge pricing.

More recent data from care platforms were supplied to the Productivity Commission for its inquiry into Aged Care Employment (2022c) and through submissions to the Productivity Inquiry. The average rates per hour for weekdays after platform fees for workers engaged via Mable (sub. IR152, p. 2) were:

- \$114 per hour (\$112 per hour Monday to Friday) for allied health care
- \$57 per hour (\$55 per hour Monday to Friday) for nursing
- \$45 per hour (\$43 per hour Monday to Friday) for social support and domestic assistance
- \$48 per hour (\$46 per hour Monday to Friday) for personal care.

On Careseekers, the average pay rate for workers providing aged care was \$38 per hour and for disability support it was \$43 per hour (pers comms, 6 and 8 August 2022). Across both platforms, average pay rates were higher on weekends and public holidays (PC 2022c, p. 8).

Disability care workers on Hireup, who are engaged as employees, are paid at the applicable award rate under the SCHADS award and receive employee entitlements (such as superannuation, casual loading, minimum payments under broken shift allowances, penalty rates and workers compensation).

a. Deliveroo exited the Australian market in November 2022.

For example, a 2019 national survey of platform workers reported a median earning rate of \$20.00 per hour for transport and food delivery, compared with a median of \$56.85 per hour for professional services (McDonald et al. 2019, p. 43). (There is also variation in the distribution of earnings rates within industries). However, the evidence suggests that the per-task fees offered by *some* platforms in food delivery *may* be on average less than the adult minimum wage for casuals based on assumptions about how many tasks were completed per hour and available public data on earnings.⁹⁴

In other industries, platform workers may, on average, earn in excess of the otherwise-applicable award rate, reflecting that workers may adjust their rate to account for the absence of employee entitlements and conditions (such as casual loading, penalty rates, superannuation and minimum shift lengths). Such rates may also reflect the current high demand for skills and services — including the capacity for many to get jobs in the formal sector as an employee and the ability for workers to differentiate their services, such as by having more experience or areas of specialisation in an industry.

For example, the average take-home pay for contract aged and disability support personal care workers on Mable⁹⁵ during weekdays is higher than the minimum weekday employee pay for a Level 3 home care worker with a Certificate III under the *Social, Community, Home Care and Disability Services Industry Award 2010* ('SCHADS award') accounting for casual loading and superannuation, though not including other allowances or the absence of workers compensation (PC 2022b, p. 8).⁹⁶ However, neither the distribution of average take-home pay on Mable, nor the share of employees paid above the relevant award minimum wage is known.

As such, relative pay and conditions established in awards for employees in the same industry or occupation and labour demand for such employee opportunities will also affect the pay rates commanded by contract platform workers.

Better data on hours worked by platform workers is needed

Within a platform, there may be a wide variation in average hourly pay rates if some platform workers work during periods of lower demand, where prices and or the number of tasks is often lower. There are some workers in ridesharing and food delivery who work close to, or exceeding, full-time hours and provide a disproportionately large share of the total service hours supplied.

For instance, in late 2017 to 2018 about 14% of a sample of Sydney Uber drivers worked more than 30 hours per week and comprised 44% of total hours driven (AlphaBeta 2019, p. 16). In 2020, about 21% of Uber Eats drivers worked more than 30 hours, however, a comparable figure for the total hours delivered was not published (Accenture 2021, p. 11).

A TWU survey found that average hours worked by their surveyed rideshare drivers and food delivery workers (across a range of platforms) were 34 hours and 38 hours per week (TWU 2021, p. 10,14). In comparison, a 2019 national survey of platform workers found an average of 14.5 hours per week worked by platform workers whose main platform was categorised as transport and food delivery (McDonald et al. 2019, p. 44). The same national survey found an average number of hours ranging from 3.4 hours per week for

⁹⁴ The casual adult minimum rate is partly relevant because casual employees receive a 25% loading to compensate for the absence of paid leave entitlements and the varied times of work.

⁹⁵ Requiring a Certificate III or two years of demonstrated experience.

⁹⁶ As of the publication of Aged Care Employment (PC 2022c). This is pending the conclusion of the work value cases relating to the aged care industry at the Fair Work Commission. These cases include various applications by the Health Services Union and the Australian Nursing and Midwifery Federation to vary minimum award wages, amend clauses, and to add additional schedules in the *Aged Care Award 2010*, *Nurses Award 2010* and the *Social, Community, Home Care and Disability Industry Award 2010* (cases AM2020/99, AM2021/63 and AM2021/65).

workers whose main platform was categorised as education, to 14.5 hours for transport and food delivery workers (being the highest average hours worked per week).

Overall, evidence about the number of hours worked is limited by uncertainty about the representativeness of the relevant surveys, the age of data, and their sample sizes. Better data would reveal the *distribution* of hours worked (including time logged on without a task), not just the average, and similarly for earnings. A further challenge is that where there are high levels of multi-apping, data from a single platform may present an underestimate of working hours. For instance, many rideshare drivers in NYC work for both Uber and Lyft.⁹⁷ As such, studies that use data from only one platform are not able to fully track activity across ridesharing (Kousta, Parrott and Reich 2020, p. 13).

Where workers rely on these forms of work as their main source of income, this may be the result of barriers to other forms of work. In some cases, this may be associated with working restrictions in visas, the need for flexible hours of working, limited English language proficiency and lack of professional networks for new migrants. For instance, in the TWU's survey, about 73% of food delivery drivers were on some form of visa (TWU 2021, p. 13). In a survey of Uber Eats delivery workers, 29% said that visa restrictions acted as the largest barrier to them obtaining work as an employee, followed by limited skills and experience (23%) and limited English fluency (15%) (Accenture 2021, p. 12). This means that for many platform workers, their realistic job options, outside of platform work, would tend to be isolated to the low-wage part of the economy (such as café workers).

In addition, some platform workers face uncertain cash flows due to the way payments are processed. Platform workers who are independent contractors do not have guarantees on a maximum period of time before they are required to be paid for their services, unless explicitly specified by a platform. Some platforms specify a specific cycle for payment (such as Amazon Flex (nd), which pays weekly) and some platforms may also allow workers to 'cash out' payments on an ad-hoc basis subject to limits (such as Uber and Deliveroo). However, other platforms may not specify a maximum time for payment processing after a service is delivered. For example, in disability care, payments relying on NDIS funding are contingent on timesheet approval, and funding may be delayed if a client overspends on an NDIS plan or if a client exceed the NDIS-imposed cap for funding on a service (Karp 2022).

Fee-setting methods can also affect the net earnings of platform workers (box 5.6).

Box 5.6 – Fee-setting in platform work

The method of fee-setting varies by platform. Independent contractors traditionally agree prices for services directly with consumers, and the use of platforms does not always change this. In contrast, rideshare and food delivery, where the service is delivered under the platform's brand rather than the individual supplier, there tends to be a consumer price and worker pay rate set by the platform.

- On many transport and delivery platforms, consumers pay a price set by the platforms.
- On some care services, workers cannot charge consumers an hourly rate below a minimum rate. For instance, on Mable, the minimum agreed rate that workers can charge as at August 2022 is \$32 per hour before platform fees. This corresponds to workers receiving a net \$28.80 per hour, and consumers paying \$33.60 per hour, after platform fees (PC 2022c, p. 76). About 10.5% of workers on the Mable platform earn less than \$40 per hour after platform fees (Mable, sub. IR152, p. 2).

⁹⁷ As determined through administrative data provided by platforms to New York City's Taxi and Limousine Commission.

Box 5.6 – Fee-setting in platform work

There may also be a ‘soft floor’ where a platform displays a recommended price that is equivalent to an award rate — for example, in Australia following an agreement between Airtasker and Unions NSW. However, the agreed price between a consumer and worker may still be below the recommended price (Unions NSW 2017).

Platform workers who set their own fees can take into account their business costs, such as insurance, tax (the absence of) workers compensation and leave provisions, as well as training and licensing fees and professional service fees. However, where platform workers do not have a capacity to set their own fees, their net earnings are vulnerable to variations in their business costs.

**Finding 7.8****There would be productivity costs in shoehorning platform work into other categories**

Categorising platform workers as employees would remove key benefits to efficiency and flexibility for workers. Many platform occupations are a direct extension of existing independent contracting arrangements, which can involve relatively high rates of pay.

Other platforms offer pay rates close to, or under, the National Minimum Wage. Workers who rely heavily on these forms of work as a major source of income often face poor job prospects for reasons that would, in many cases, be better addressed directly.

Collective bargaining for contract platform workers

Platform workers who are independent contractors could theoretically collectively bargain with platforms to determine binding pay rates and conditions that are tailored to a platform and the type of work performed (which would be outside the enterprise bargaining framework that applies to employees). However, agreements in Australia between platforms and unions have focused on determining the agreed principles on which certain types of platform work should operate, such as industry-wide minimum standards determined by an independent body. Such negotiations have been undertaken outside any collective bargaining framework and none have yet resulted in a binding floor price that applies to all workers on a platform.

This could reflect within-industry competition, or the probability (and potential nature) of expected future regulation by governments. It could also reflect that *some* platform workers have other ways of bargaining that do not centre on securing binding pay rates — by ‘voting with their feet’ if their conditions are not sufficiently attractive, as evidenced by relatively high churn rates. For example, within 6 months, about 40 to 50% of Sydney Uber drivers had exited (Alexander et al. 2022, p. 181).

Collective bargaining for contract platform workers operates under a different framework than that of enterprise bargaining for employees

A complicating factor for any use of collective bargaining for contract platform workers is that as independent contractors, collective bargaining would fall under competition law, not employment law. As such, individual

platform workers — operating as businesses — are considered competitors to one another.⁹⁸ Without a competition exemption from the ACCC, businesses (such as platform workers) who join to collectively bargain with a target business (such as a platform) could violate competition laws. The ACCC (2014, p. 3) stated that:

In the context of competition law, collective bargaining refers to an arrangement under which two or more competitors come together to negotiate terms and conditions (which can include price) with a supplier or a customer. Groups of businesses may sometimes appoint a representative, such as an industry association, or in some cases a union, to assist them in the bargaining process.

The CCA [*Competition and Consumer Act 2010* (Cth)] requires businesses to act independently of their competitors when making decisions about pricing and other terms and conditions of trade. By engaging in collective bargaining participants are at risk of breaching the CCA. Authorisation of collective bargaining is a transparent process by which the ACCC may grant protection from legal action where it is satisfied in all the circumstances that the proposed collective bargaining arrangement is likely to result in a public benefit that would outweigh the likely detriment to the public arising from any lessening of competition.

This collective bargaining framework for businesses is distinct from enterprise bargaining by employees, where enterprise bargaining processes are enshrined in the FW Act, not in competition laws.

Although the collective bargaining framework for businesses was not specifically designed for some of the more common platform work situations — such as those involving many individual independent contractors, a platform that sets prices, and low barriers to joining — contract platform worker collective bargaining may be pursued through an exemption from competition laws.

The simplest way for independent contractors to obtain a competition exemption is through using the ACCC's collective bargaining class exemption.⁹⁹ Other methods include going through the notification and authorisation processes (box 5.7), although target businesses, such as a platform, are not legally obliged to bargain. The ACCC is able to 'withdraw the benefit of the class exemption from particular businesses (but not retrospectively) if it is satisfied that the business, or businesses, is engaging in collective bargaining conduct that substantially lessens competition and is not likely to result in overall public benefits' (ACCC 2021, p. 12).

To date, there has been no test of collective bargaining arrangements through the collective bargaining class exemption, or through notification or authorisation processes by contract platform workers, with or without union involvement (ACCC, pers comms, 21 Sep 2022).

Competition exemptions and large-scale contract platform worker collective bargaining

A platform has little incentive to engage in collective bargaining with small groups of platform workers and there is no legal requirement for a platform to engage with platform workers under collective bargaining

⁹⁸ Although platform workers covered by Chapter 6 of the *Industrial Relations Act 1996* (NSW) may also have collective bargaining rights for the purpose of negotiating contract agreements — relating to contract conditions — under NSW industrial law, without requiring competition exemptions. For instance, the TWU stated that Amazon Flex drivers 'enjoy enforceable rates of pay along with rights to dispute resolution, union representation and collective bargaining' following a revised NSW Industrial Relations Commission determination which expanded coverage to eligible owner-drivers of vans with a carrying capacity between 1.5 and 3 tonnes (TWU 2022).

⁹⁹ Broadly, the class exemption enables a business or independent contractor with aggregated turnover of less than \$10 million in the preceding financial year, to form or join a collective bargaining group to negotiate with suppliers or customers about the supply or acquisition of goods or services without the risk of breaching competition laws.

arrangements in the CCA. However, a large enough group of workers may have the bargaining power to bring the platform to the bargaining table, though they would face several legal hurdles in doing so.

Whether a competition exemption is available for large-scale collective bargaining turns on two factors: whether collective bargaining by a bargaining group would substantially lessen competition and whether collective bargaining would likely result in a net public benefit. Under competition law, higher pay rates resulting from an exemption to collective bargaining by platform workers might be seen as giving workers countervailing power to address apparent monopsony power by a platform. In some of its general competition investigations, the ACCC has expressed concern about monopsony power, as in the apparent behaviour of supermarkets in respects of their suppliers (ACCC 2020). It has advocated for the inclusion of a prohibition of unfair trading practices in the CCA, though that has not yet occurred. It is unclear whether the ACCC would regard platforms as exercising monopsony power over platform workers and even if convinced of this, whether it would regard an exemption a reasonable substitute for a prohibition of unfair trading practices. More generally, the position the ACCC has taken with respect to countervailing power (as in merger decisions), the ACCC has given most weight to the issue of whether any action by market participants substantially lessens competition. The ACCC has not yet made determinations in this area in relation to collective bargaining and platform workers.

While the collective bargaining class exemption allows businesses to lodge applications to *automatically* gain protections from some aspects of competition law, the ACCC actively monitors all lodgements and can withdraw the benefit of the class exemption from parties if such bargaining activity is likely to fail the net public benefit test.

However, a possible conceptual framework for determining whether exemptions should be given for large-scale collective bargaining by platform workers could usefully focus on the degree to which:

- the platform controls key aspects of the transaction, such as setting consumer-facing prices and worker pay rates
- there is sufficient price competition in the *markets in which current platforms compete*, either from rival platforms or non-platform competitors.

Where competition in those markets is strong, the capacity for collective bargaining at the platform-specific level to raise consumer prices excessively is tempered by the competitive pressures of rival platforms and other sources of market supply. For example, negotiation of a collective agreement in relation to earnings between, say, Uber and its rideshare drivers, may not substantially lessen competition in the market for on-demand passenger transport services.

A further issue is that whereas employees negotiating enterprise agreements have the right to take protected industrial action in support of their claims, a coordinated withdrawal of labour by contractor platform workers (a 'collective boycott') is legally complicated. The collective bargaining class exemption does not include an exemption for collective boycotts, meaning platform workers would have to go through the notification process or the authorisation process (ACCC 2021, p. 13).

A major obstacle to collective bargaining for platform workers is the placement of the issue in competition law rather than workplace relations law. Under workplace relations law, the focus is on employee versus employer bargaining strength and the resulting balance between the returns to employers versus employees. The Modern Awards Objective of the FW Act does not refer to consumers at all (though we recommend that it should do), with the only explicit connection to their interests incorporated indirectly in s. 134(1)(h) which refers to inflation. (In contrast, under the CCA, consumers' interests are central.)

Moreover, in rideshare platforms, for example, arrangements for independent contractors share several common attributes with arrangements for employees of a large business (rather than for small competing businesses). For instance, there are often thousands of individual contractors with common contractual ties

to a single entity (the platform). The platform typically controls the customer-facing relationship, such that customers book a service under the platform's name, rather than choosing between competing contractors. In addition, platforms in these industries tend to control many aspects of how work is carried out.

In some sense, there are reasonable arguments that the coverage of platform workers by the CCA reflects flaws in the CCA. That said, platform workers are typically not employees in the conventional sense and so it is not straightforward to place them under the umbrella of workplace relations law either. Accordingly, platform workers bring into sharpest focus the tension between competition and workplace relations law, and deciding where the line should be drawn is somewhat arbitrary.

Box 5.7 – Obtaining a competitive exemption for collective bargaining purposes

Competition exemptions for the purpose of collective bargaining (not enterprise bargaining) can be obtained through the collective bargaining class exemption (by lodging the notice form with the ACCC and any target businesses — such as a platform), or by going through the notification or authorisation process. The authorisation process involves a public consultation process and the publication of a draft and final determination by the ACCC.

Whether the ACCC grants an exemption in response to an authorisation application, allows a notification to stand, or withdraws the collective bargaining class exemption for a bargaining group is decided on a case-by-case basis. Broadly, bargaining groups are successful in obtaining a competition exemption if the ACCC finds that the arrangements are not harmful to competition and/or are likely to result in overall public benefits.

Although public benefit is not defined in the *Australian Competition and Consumer Act 2010* (Cth), the public benefits have been generally defined on a broad basis by the Australian Competition Tribunal (the Tribunal). The Tribunal has stated that public benefits include (ACCC 2019, p. 43):

... anything of value to the community generally, any contribution to the aims pursued by the society including as one of its principal elements (in the context of trade practices legislation) the achievement of the economic goals of efficiency and progress'. Plainly the assessment of efficiency and progress must be from the perspective of society as a whole: the best use of society's resources. We bear in mind that (in the language of economics today) efficiency is a concept that is usually taken to encompass 'progress'; and that commonly efficiency is said to encompass allocative efficiency, production efficiency and dynamic efficiency.

While public detriment has been defined by the Tribunal to include:

any impairment to the community generally, any harm or damage to the aims pursued by the society including as one of its principal elements the achievement of the goal of economic efficiency.

Unions cannot provide notice on behalf of platform workers (or any other independent contractors or businesses) through the class exemption or through the notification process. However, a union can act as a bargaining representative, regardless of which of the three processes the exemption is obtained through. If a union wished to obtain legal protections from potential liability under competition law for itself (in addition to the bargaining group), the union would need to go through the authorisation process.^a

Box 5.7 – Obtaining a competitive exemption for collective bargaining purposes

a. The Transport Workers' Union has applied for (and received) authorisation for a number of collective bargaining arrangements relating to owner-drivers, albeit on a small scale. For example, see ACCC authorization numbers A91589, A91514 and A91427 (authorisations granted).

Source: ACCC (2021).

Internationally, there have been a few cases where worker representatives have played a role in shaping the pay and conditions of platform workers (though the workplace relations contexts in all these cases have differed from Australia). For instance:

- In Canada, Uber and the United Food and Commercial Workers Canada (UFCW) union agreed to 'press provincial governments' to establish industry-wide standards including on a pay rate of at least 120% of the minimum wage during 'engaged time' (that is, when a driver is transporting a passenger) and a benefits fund, while establishing a dispute resolution mechanism for Uber platform workers (Bellon 2022; Uber Canada 2022).
- In the United Kingdom, Uber formally recognises the GMB union — Uber drivers are legally 'workers', an intermediate category between employee and contractor. In August 2022, the GMB union claimed credit for increasing driver pay rates after fares were raised in London by 5%, although in an official statement, Uber suggested that higher fares were implemented to attract more drivers (GMB 2022; Levingston 2022).
- In France, rideshare drivers will receive a minimum of EU€7.65 per trip, following a sector-wide agreement between rideshare platforms and unions announced in January 2023 (Hummel 2023).

Contract platform workers may have little to trade away in collective bargaining

Regardless of the interpretation of the exemption provisions of the CCA or the option of covering platform workers through workplace relations law, collective bargaining in platform work presents fewer opportunities for higher returns to workers than in collective bargaining for many other workers. The productivity gains that can be associated with enterprise bargaining between employers and employees — including conditions that allow for greater managerial flexibility and avoiding industrial disputes — are not likely to be present in collective bargaining between platforms and platform workers.

In enterprise bargaining, greater monetary (or non-monetary) benefits for employees are the result of trading away entitlements that may limit productivity in the workplace. For vertical platforms, where the platform sets the pay rate — especially where algorithms adjust pay rates in real time in response to demand fluctuations — platforms are already providing close to the exact wage level and working conditions required to attract the workers they need.¹⁰⁰

As contract platform workers do not have any legislated minimum standards (outside of those established through the IC Act and any applicable state-based legislation), a platform could unilaterally implement the conditions without having to provide an increase in monetary benefits, subject to the contract between the platform and the worker and the capacity for the platform to attract and retain workers. Many, if not most, of the standard form contracts between platforms and platform workers have provisions that allow the platform to modify the terms of the contract, with little or no notice.

¹⁰⁰ If there is a worker shortage, the platform could temporarily increase pay rates to increase the incentive for more workers to be available to provide services.

Furthermore, as currently structured, pay arrangements in vertical platform work is transactional in nature, reflecting the homogeneous type of work and the highly prescribed arrangements for organising work through platforms. While platform work is not unco-operative, the goal of co-operative engagement between employees and employers that is a desired feature of workplace relations is not paramount, and would be unlikely to be facilitated by collective bargaining under the CCA. Co-operation and trust in standard employer/employee relationships create norms that improve managerial and worker conduct, reducing the need for costly monitoring. But in the platform world, it is generally difficult for platform workers to continually ‘shirk’ in the sense of getting paid for a task not done (particularly with telemetry data collection and performance rating systems), nor is it as easy for the platforms to engage in unfair practices specific to individual workers.

While workplace relation policy and the associated rules about bargaining have tended to reduce the incidence and costs of industrial disputes and lockouts, this is not an issue in the platform economy. Indeed, one goal of any bargaining under the CCA would have the opposite intent — to permit platform workers to legally withdraw their labour in a collective boycott so as to provide greater pressure on platform providers for improvements in conditions. That would not necessarily be bad, but its effect would not be higher productivity to the extent that this was the goal. Accordingly, large scale collective bargaining in platform work is unlikely to lead to productivity improvements as the mechanism for funding higher wages. Instead, at best, it would increase the bargaining power of platform workers, allowing them to extract some of any rents from platforms or from consumers through higher prices, which may or may not pass the net public benefit test specified in the CCA.



Finding 7.9

There are significant hurdles to securing binding agreements on pay for contract platform workers through collective bargaining.

Securing binding agreements on pay for contract platform workers through collective bargaining faces two main hurdles:

- Collective bargaining would be unlikely to provide sufficient productivity improvements to fund any material improvements in pay and conditions.
- While large-scale collective bargaining may increase the negotiating power of platform workers to increase their earnings by extracting profits from platforms or raising prices of services, such bargaining (or collective boycotts) by contract platform workers may not pass the net public benefit test under competition law — as such, bargaining groups may not be eligible for a competition exemption.

5.4 Improving dispute resolution between platforms and workers

Processes to resolve workplace disputes that may arise between the platform and worker have a significant bearing on how that working relationship operates in practice. Ineffective resolution arrangements may result in high turnover and poor incentives for workers. Consumer confidence in platforms also relies on assurance that platform operators can manage poor quality service by platform workers.

Workplace disputes between platforms and workers may relate to suspension or termination decisions, or (partial) non-payment for services or fines imposed by a platform, where a platform believes a worker has not completed a task to satisfaction or that there are risks to a consumer’s wellbeing. Some decisions may be based on performance thresholds or have some algorithmic involvement (particularly for some vertical

platforms). Other forms of disputes may arise where a contract platform worker believes that there are unfair contract terms in the services contract.

Current internal dispute resolution processes are flawed. The existence of appeal processes and the rationale for platform decisions are not always apparent to workers, while external remedies are only partial, costly and often not accessible to workers with limited English proficiency and limited legal knowledge.

Dispute resolution does not just involve the interests of platform workers. In some cases, suspension or termination from a platform is warranted. For instance, Mable (sub. IR152, p. 3) highlighted that the importance of consumer safety in aged care and disability care:

Because of the nature of the care economy, the principles of natural justice can be at odds with ensuring appropriate care to, at times, vulnerable clients. As such, in instances where there may be a risk to clients — due to a breach of any of the above instruments where an individual's welfare might be at risk — Mable will suspend or remove individuals from the platform.

Any dispute resolution process must consider consumer outcomes, including consumer safety and service quality, and will be different for horizontal and vertical platforms as there are differences in the amount of control a platform has over how a task is performed.

Internal dispute resolution is in a formative stage

Internal dispute resolution mechanisms vary by platform and jurisdiction, as does the information available to contract platform workers on public-facing websites. For instance, Airtasker states that it arbitrates disputes between a worker and consumer relating to task performance (Airtasker 2022) and Mable states that if a consumer and support worker cannot resolve a dispute that either party can contact Mable by phone (Mable 2020).

On some platforms, it may not be clear to workers about how to initiate an appeal or review by a platform representative — or that an appeal mechanism exists — beyond contact via email or through a webform, which are not modes of real-time communication. For instance, in Australia, Uber's webpage on deactivation¹⁰¹ does not include the word 'appeal' (though it states that workers can contact the support team for assistance) while in some jurisdictions in North America, Uber drivers (or other rideshare drivers) can be reactivated following a dispute resolution process.

- In New York City, Uber drivers can appeal eligible deactivation decisions to a driver panel, which comprises a selection of Uber drivers with high star ratings (Uber 2020).
- In Washington State, deactivated rideshare drivers can be represented by the Driver Resolution Center during state-regulated dispute resolution (rideshare platforms must notify deactivated drivers that they can appeal a deactivation). Upon request, platforms must provide a detailed response about why a driver was deactivated. Following that, if a driver wishes to appeal, dispute resolution occurs through a two-stage process. If a dispute is not resolved through the initial 'good faith, informal resolution process', there is a 'formal process that includes a just cause standard' (Washington State Legislature 2022).
- In Canada, Uber drivers can be represented by the UFCW union during deactivation appeals or in other disputes in internal processes, the costs of which are jointly funded by the UFCW union and Uber (Deschamps 2022).

In the United States and Canada, rideshare drivers who have been deactivated because of low ratings or high cancellation rates may be eligible for reactivation after taking a 'quality improvement course' (Uber nd).

¹⁰¹ As on <https://www.uber.com/au/en/drive/safety/deactivations/>, accessed 16 December 2022.

In New York City, the course is provided by the Independent Worker's Guild and free of charge to the deactivated driver, while in other jurisdictions, the driver may incur a fee to access the course.

External dispute resolution remedies are largely unattainable

External remedies for disputes for contract platform workers in Australia are only partial in scope and not an accessible mechanism for most platform workers. The existing arrangements include:

- unfair contract terms provisions within the IC Act or the Australian Consumer Law¹⁰² (the latter relating to standard form contracts where a party is a small business. Many of the contracts between platform workers and platforms would likely be considered standard form contracts)
- state and territory mediation and arbitration services
- state and territory tribunals.

Furthermore, it is unclear how these existing external dispute resolution remedies interact with arbitration clauses present within some contracts between a platform and platform worker. While arbitration clauses vary, they generally reduce or exclude the ability to pursue a claim through some statutory law avenues, common law avenues or both by requiring the worker to participate in binding arbitration through the platform's selected arbitration service, rather than to initiate court proceedings if a dispute is present.¹⁰³ Some arbitration clauses may also exclude the ability of an arbitrator to hear a class action.

Workers who choose to initiate arbitration under a platform's arbitration clause may be required to pay upfront arbitration fees. Arbitration costs, notwithstanding legal fees, potential damages or the opportunity cost of participating in arbitration, can include administration or filing fees (a lump sum) and the costs of having an arbitrator present at a hearing (which may be hourly or a lump sum comprising the length of an arbitration session) — the amount incurred by a worker and platform would depend on the exact fee schedule.

Some platforms may allow a worker to opt out of arbitration clauses, though this option may be time-limited and subject to strict requirements as to validly provide notice. For instance, in Australia, DoorDash provides an opt-out period of 30 days following the platform worker having agreed to the services contract, otherwise the platform worker is deemed to have agreed to the arbitration clause. Furthermore, if a platform worker wished to opt out, they would need to send notice in writing through post to a selected postal address — 'any attempt to opt out by email [would] be ineffective' — and workers could not opt out using an agent or representative (DoorDash nd).

Review of service contract under section 12 of the Independent Contractors Act

A contract for services can be reviewed by the Federal Court or Federal Court Circuit under section 12 of the IC Act — on the grounds of the contract being unfair, harsh or both. An application for review may only be brought by a direct party to a contract. Participants incur their own costs bringing or defending a case in the Federal Court or Federal Court Circuit unless deemed vexatious or without reasonable cause. Most platform workers would not likely have the financial means to use this remedy or knowledge of the remedy. This review mechanism is rarely used (IRV 2020, p. 167) and to the best of our knowledge, has not been used

¹⁰² The Australian Consumer Law is Schedule 2 of the *Competition and Consumer Act 2010* (Cth).

¹⁰³ Though arbitration clauses, as contract terms themselves, may be unenforceable if a court finds the term to be unconscionable. For instance, in *Uber v Heller* [2020 SCC 16], the Supreme Court of Canada allowed a class action to proceed outside the arbitration clause because of the upfront administrative and filing fees (about US\$14 500) required for the lead plaintiff, a food delivery worker, to lodge arbitration in the International Chamber of Commerce in the Netherlands. The administration and filing fees would have 'represented most of [the plaintiff]'s annual income' and did not include legal fees, foregone earnings and other costs of participating (Supreme Court of Canada 2020, pp. 4–5). Platforms have largely responded by selecting domestic arbitration services.

relating to platform work. It is not clear whether a court could order reinstatement under the IC Act even if the court had found that there were unfairness grounds within the services contract.

Penalties for unfair standard form contracts where a party is a small business

The ACCC and each state and territory consumer protection agency administer the unfair contract terms laws in the Australian Consumer Law. Small business, including independent contractors, who consider they are subject to unfair contract terms in any standard form contract can also take their own legal action in state and territory tribunals and small claims courts. The *Treasury Laws Amendment (More Competition, Better Prices) Act 2022* (Cth) has recently amended the unfair contract terms laws so that, for conduct from 9 November 2023, a court is able to impose pecuniary penalties for contraventions of the unfair contract terms laws, in proceedings commenced by the regulators (ie. the ACCC and the state and territory consumer protection agencies). Independent contractors that take their own legal action are able to seek damages, injunctions or other orders (such as the variation of their contract). The ACCC notes that:

As an economy-wide regulator, the ACCC cannot pursue all matters that come to its attention. For example, in the 2021-22 financial year the ACCC received just under 380,000 contacts. The ACCC takes a strategic approach to enforcement and is selective in the matters it investigates. The ACCC assesses which matters it will investigate based on its compliance and enforcement policy and priorities, to direct its resources to matters that provide the greatest overall benefit to the public. In particular, the ACCC focuses on conduct that will, or has the potential to, harm the competitive process or result in widespread consumer or small business detriment. (ACCC, Pers. Comms., 1 February 2023)

Independent contractors may also be able to seek assistance from the Australian Small Business and Family Enterprise Ombudsman (ASBFEO), or state and territory Australian Consumer Law regulators, or small business commissioners in their state, in formal or informal dispute resolution about potential unfair contract terms in standard form contracts.

The Inquiry into the Victorian On-Demand Workforce similarly has identified state civil and administrative tribunals as a potential avenue for recourse, but the Inquiry expressed doubts about whether such tribunals have jurisdiction over disputes relating to topics deemed as ‘workplace relations matters’ under section 7 of the IC Act (IRV 2020, p. 171).

State and territory mediation and arbitration services

State and territory small business agencies or commissions may offer mediation services, which, while not imposing binding decisions, aim to help parties reach an agreement. For instance, the Victorian Small Business Commission offers mediation services for small business, including for contract platform workers. Parties do not have to participate in the process if they do not wish to.

Some contract platform workers may have access to state and territory arbitration services — where the arbitrator can impose binding decisions — but such remedies are limited to certain states and types of platform work (the legislation governing such arbitration services may have exemptions from the IC Act).¹⁰⁴ For instance:

- in Victoria, platform couriers (including food delivery platform workers but excluding rideshare workers) can pursue arbitration by the Victorian Small Business Commission if mediation fails to produce a satisfactory result (IRV 2022)

¹⁰⁴ For instance, Part 5 of the *Owner Drivers and Forestry Contractors Act 2005* (Vic) and Chapter 6 of the *Industrial Relations Act 1996* (NSW).

- in New South Wales, a limited class of contract platform workers, including Amazon Flex drivers, are eligible for conciliation and arbitration under Chapter 6 of the *Industrial Relations Act* (NSW).

Improving internal and external dispute resolution in platform work

Given the gaps in, and barriers to using, dispute processes, there are grounds to create more systematic, low-cost and accessible means for parties to seek to resolve problems. In dispute resolution, best practice usually involves several tiers:

- robust internal dispute resolution is the first step as it can be quick, low cost and have the advantage that it requires suppliers to have a systematic approach to dealing with complaints
- external resolution by an independent body that can, if necessary, make determinations to resolve a dispute that has not been settled through direct engagement between the disputing parties.

Principles guiding best practice internal dispute resolution

Such internal dispute resolution principles are already well established. Within platform work, the Victorian Government will introduce voluntary standards in early 2023, including that related to dispute resolution (IRV (2022)). The Treasury, ACCC and ASIC have also published guidance (and regulation, for the latter) for internal dispute resolution, though not related to platform work. There is also an Australian Standard (AS 10022:2022) for complaint handling management in organisations, most recently updated in 2022. The Fair Work Ombudsman has set out detailed advice on effective dispute resolution (FWO nd).

Some common themes emerge — internal dispute resolution processes should be accessible, timely, fair and should provide complainants with substantive responses in writing. The digital nature of platform work should also be considered in dispute resolution — most platforms do not have a face-to-face presence where workers can raise issues with platform representatives. These features should be present in all internal resolution processes.

An external, independent dispute resolution body for platform work with conciliation and arbitration powers

As existing avenues for dispute settlement through the Australian Consumer Law, the IC Act and patchy state-based arrangements do not provide an accessible or systemic solution, there is a rationale for a new institutional arrangement to serve that role. As noted in box 5.4, the TWU and Uber have already supported the creation of an independent review body to cover on-demand rideshare and food delivery non-employee platform work and platforms.

Given that the disputes fall into a workplace relations framework, and given its existing strengths in investigation, conciliation and resolution of disputes, the FWC looks to be a natural home for an external resolution function. Housing the function in the FWC would avoid the fixed costs of a new institution. Notably, the FWC has a well-established process for dealing with unfair dismissals, with an emphasis on conciliation, but with the scope to take matters to a formal conference. It would adopt a similar approach to platform-related disputes, and workers would face no charges for the services.

The independent body within the FWC could be funded through general revenue — as is the FWC. However, there are grounds for using a combination of an industry levy¹⁰⁵ to cover the fixed costs of the complaints function and a charge per complaint for the relevant platforms. The latter would encourage

¹⁰⁵ This would be consistent with the levy arrangements of various other complaints hearing bodies, such as the Australian Financial Complaints Body.

platforms to improve internal processes so that the number of disputes escalated externally remain low. Given the small number of platforms, a levy approach would not entail large compliance and administrative costs. As noted above there are some existing ad hoc arrangements for conciliation and arbitration. Were the FWC to undertake this function for all contract platform workers and for all jurisdictions, these arrangements would become redundant. However, in the transition to the FWC taking over the role, it would be sensible for any lessons from the Victorian and NSW arrangements to be used in developing the FWC's conciliation and arbitration role. It is probably undesirable to extinguish the legal remedies available under the Australian Consumer Law and the IC Act, if for no other reason that it would require any new legislation to set out difficult to define boundaries for what constitutes platform work. In any case, it is unlikely any party would resort to remedies under these Acts given their cost and lack of accessibility.



Recommendation 7.18

Introduce independent dispute resolution for platform workers

The Australian Government should introduce an external, independent dispute resolution function within the Fair Work Commission that can provide conciliation and arbitration services relating to suspension or termination disputes or non-payment of earnings. The function should be funded by platforms and should be designed to encourage platforms to improve internal processes, rather than relying on the external body as the primary method of resolving disputes.

5.5 Platform work and safety

As noted above, while the efficiency-enhancing aspects of platform business models could be at risk under certain regulatory approaches, it is important to consider where legitimate needs for regulation remain. If platform business models were *only* viable because they avoid legitimate regulation, or because they can lower costs by not fully internalising risks to safety, then they would not be the source of properly-measured productivity gains. For instance, personal injury risks to platform work should be adequately insured, otherwise risk would be transferred onto public insurance programs, such as Medicare and the NDIS. As such, it is important to consider how genuine safety issues can be effectively addressed, and whether this can be achieved while retaining the benefits associated with platform work business models.

As with other forms of work, platform work involves safety risks for consumers and workers (box 5.8). While platform workers experience a wide range of health and safety risks, disentangling how much of this is *caused* by platform work and how much is due to the type of tasks they perform is not clearcut. Safety outcomes are influenced by a number of factors including the systems and processes that platforms have in place for risk reduction, the tasks a worker performs and how they are performed. Platforms have various WHS obligations (box 5.9) and safe work regulators are well-placed to provide ongoing guidance on best practice for platforms (for instance, regarding fatigue management systems in ridesharing). Personal injury insurance and workers' compensation comprise one area of policy where platform work often differs from employment relationships. The remainder of this section will largely focus on personal injury risks and insurance.

Box 5.8 – What do we know about safety in platform work?

Aged Care Work — While there is no public data on the health outcomes of aged care platform contractors, aged care work involves physical and mental health risks. For instance, about 14% of aged care workers reported a work-related injury or illness in the 12 months preceding 2016 (Mavromaras et al. 2017, p. 42). These injuries or illnesses were most commonly sprains or strains, chronic muscle or joint conditions and stress or other mental conditions.

Taxi and ridesharing work — Taxi drivers are at high risk of motor vehicle accidents and musculoskeletal disorders (Burgel, Gillen and White 2012), the latter which may be exacerbated by long working hours (Murray et al. 2019). In a TWU survey of rideshare workers, 34% of respondents had been involved in a car accident, 66% had experienced some form of harassment and 17% had been physically assaulted (TWU 2021, p. 14). (Most resulting injuries will not be covered by the catastrophic injury insurance schemes operating across states and territories.)

Food delivery work — Food delivery workers may be less protected in a transport accident if they are using a bicycle, motorcycle or scooter and may face time pressures to complete tasks (SIRA 2021a, p. 4). The deaths of food delivery workers in New South Wales in late 2020 prompted the NSW Government to set up a taskforce to improve safety in food delivery platform work. A TWU survey reported that 34% of respondents working on food delivery platforms had been injured while completing tasks (TWU 2021, pp. 10, 14). Delivering on multiple platforms simultaneously — called ‘multi-apping’ — could pose additional risk through time pressures and the need to interact with multiple apps while on a bicycle or by motorised vehicle (SIRA 2021a).

Box 5.9 – WHS laws apply to platforms and contract platform workers

Model WHS laws, which are implemented in all states and territories bar Victoria, state that the primary legal duty of care, to a worker as reasonably practicable, belongs to a person conducting a business or undertaking (PCBU). A PCBU may be the contract platform worker themselves *and* the platform they work on. A worker can be an independent contractor or an employee, as the model WHS laws are agnostic to employment status and are intended to be responsive to changes in the way people work (Stewart-Crompton, Mayman and Sherriff 2008, p. 63).

Safe Work Australia states that the model WHS laws apply to the platform economy and other non-standard working arrangements, but that the manner in which laws are applied depends on each case, including the contract terms of engagement (Safe Work Australia, pers comms, 28 October 2022).

Under Victorian occupational health and safety (OHS) law, platforms also have obligations to contract platform workers:

WorkSafe confirmed that platform businesses do have duties to workers, whether employment or independent contracting arrangements are used. Duties are also owed by clients, customers and procurers of services who engage workers, but vary depending on the nature of the arrangement between the parties — a central question is whether the worker is directly engaged as an employee or an independent contractor?

Box 5.9 – WHS laws apply to platforms and contract platform workers

Once this question is answered, secondary questions arise about the extent of the duties that the platform must fulfil. The OHS Act would impose obligations on a platform business to ensure, so far as is reasonably practicable, that the workplace is safe and without risk to health in relation to matters over which the platform business has management or control. (IRV 2020, p. 117)

While model WHS laws make clear that the primary duty of care is not limited to ‘any particular relationships’, the next review of model WHS laws will also provide an opportunity to identify recommended changes if needed to address WHS risk specific to platform work.

The previous review of model WHS laws (Boland 2018) recommended:

- continuous assessment of new industries, hazards and working arrangements (Recommendation 3)
- development of a new model Code on the principles that apply to duties (Recommendation 5).

In response to these recommendations, Safe Work Australia is developing guidance materials on principles applying to WHS duties and consultation relating to platform work (Safe Work Australia, pers comms, 28 October 2022).

Platforms’ obligations under State legislation and from state-based regulators

Platforms may also have obligations imposed by State WHS legislation and regulators. For instance, New South Wales introduced legislation in July 2022, which requires food delivery platforms to provide personal protective equipment (PPE) (meeting Australian standards) and to provide onboarding and induction training. Food delivery platform workers are also required to wear the provided PPE while working, to complete training, and maintain a record of completion.

In New South Wales, the Point to Point Transport Commission regulates ridesharing (as well as taxis and hire vehicles). Although there are no national fatigue laws relating to rideshare drivers, the Point to Point Commissioner considers that service providers (rideshare platforms) are required to have oversight of fatigue through fatigue policies and an effective fatigue management system under NSW laws (Wing 2021, pp. 9–10).

Platforms can improve WHS systems and controls

SafeWork NSW and Transport for NSW created a Joint Taskforce on Food Delivery Rider Safety in collaboration with major platforms and Domino’s, following the death of four food delivery workers in New South Wales in late 2020 (SafeWork NSW 2020). The Joint Taskforce published a report with recommendations on WHS (2021, pp. 12–13) and published an Industry Action Plan where participants committed to platform-specific initiatives that would improve the safety of food delivery workers, for instance, better application design to reduce distractions while on the road.

A number of platforms have created worker safety groups, which can help bridge the generally limited contact between platform representatives and workers outside of the platform acting as an intermediary to allocate or to assist in task matching or when there is an incident or dispute.

For food delivery platform work, local governments may also have a role with urban planning and improving safety for ridesharing and food delivery platform work.

What personal injury insurance arrangements do platform workers have?

Access to personal injury insurance depends on whether a platform worker is an employee or contract platform worker. Platform workers who are employees, such as Hireup disability support workers, can lodge workers compensation claims. They may also have access to other support from their employer as part of meeting WHS obligations. For example, Hireup stated that it engages rehabilitation consultants to assist injured disability support employees and that it investigates ways that injured employees can modify their disability support work. Beyond those platform workers who are employees, the presumption is that many workers will not be covered.¹⁰⁶ A limited set of independent contractors are covered under 'deemed worker' provisions in workers compensation legislation, although coverage differs by state and territory.¹⁰⁷

While in principle, platform workers could take out their own personal injury insurance or income replacement insurance, they typically lack the buying power of platforms that benefit from economies of scale, do not have the capacity to limit the overall risk of the working environment to obtain lower premiums, and may not be able to afford the premiums. As such, their insurance arrangements will depend on the platform, as well as workers' risk appetite and financial means.

Some platforms provide commercial insurance, while other platforms require the worker to separately purchase a specified level of insurance, or state that purchasing insurance is voluntary with the onus on the worker to purchase insurance either through the platform or an external insurance provider if they want coverage. For instance:

- Doordash, Menulog and Uber Eats are signatories¹⁰⁸ to the National Food Delivery Platform Safety Principles — created by initial signatory platforms with Ai Group — which states that signatories will provide 'free, automatic insurance protections that cover delivery workers for accidental injuries that arise while delivering on food delivery platforms' (Ai Group 2021). Hungry Panda has also signed up to the Safety Principles, though they are not an initial signatory to the Safety Principles (NSW Government 2022, p. 1).
- Mable, an aged care and disability support platform, states that work arranged through the platform includes liability, medical malpractice and personal accident cover arranged by Mable through an insurance broker (sub 152, p. 2).

The personal injury and liability risks from some types of platform work involving automobiles may be partially covered through compulsory third-party (CTP) insurance, which is a legal requirement to register a vehicle. In some states, drivers are required to purchase their own CTP insurance from insurers, while in others, CTP insurance is bundled with the payment of vehicle registration fees. However, some forms of CTP insurance explicitly exclude coverage for commercial activities, such as ridesharing and food delivery,

¹⁰⁶ For instance, the NSW State Insurance Regulatory Authority (2021a, p. 5) stated that there was a 'general view that people providing food delivery platform economy services are, in most cases, not likely to be covered by the [NSW's workers compensation] scheme'. There is only a limited body of case law (Safe Work Australia 2021b, p. 11). One exception related to a case in June 2022, in which an insurer operating as an agent for NSW's workers compensation scheme ruled that a food delivery worker was engaged by Hungry Panda (a platform) as an employee at the time of his death. As such, the worker's family was eligible for the lump sum death benefit of \$834,000 payable under workers compensation (Bonyhady 2022). Some commentators have suggested that the decision may open the door to more platform workers being eligible for workers compensation, although eligibility would depend upon specific working arrangements.

¹⁰⁷ For instance, in New South Wales, those meeting the criteria specified in Schedule 1 of *Workplace Injury Management and Workers Compensation Act 1998 No 86* (NSW).

¹⁰⁸ Deliveroo was an initial signatory but exited the Australian market in November 2022.

although workers could choose to add additional coverage for commercial activities through different insurance products, albeit with a higher insurance premium.

Evaluating the risks of types of platform work to contract platform workers

Policymakers will need to consider the risks that workers face during platform work — including the probability and severity of risks and the history and number of incidents, injuries and fatalities by types of platform work, taking account of safety and risk management systems that platforms have in place. Specific aspects of the platform business model are likely to influence the type and degree of risk involved, as well as the potential solutions.

- Vertical platforms that have more control over assigning tasks to workers and price setting have greater ability to reduce risk through app and task design — particularly where the platform’s application is directly used by workers and is active during the completion of tasks.
- Some platform work is conducive to multi-apping, which could increase risk where it results in greater time pressures. For instance, during a ‘shift’, food delivery platform workers may search for tasks on different apps and may be able to complete or progress deliveries from multiple apps simultaneously where they are on concordant routes. A multi-apping food delivery platform worker may also interact more often with their phone (for instance, to accept orders and view directions on a map) in traffic.

Data will be important to quantifying risk. However, there is little publicly available data on safety outcomes and incidents, bar what is provided by platforms to various government inquiries on request (by nature, one-off) and the data that must be provided to WHS regulators to meet regulatory requirements (and then, what is later published by regulators). For instance, in Victoria, a ‘notifiable incident’ to Commercial Passenger Vehicles Victoria for ridesharing includes incidents involving the death or serious injury of any person or if a police officer or health professional is in attendance.¹⁰⁹

Safe Work Australia stated that there were limited datasets detailing safety outcomes for platform work (Safe Work Australia 2021a):

- The ABS work related injuries and illness survey, which is published every four years. However, it can have high sampling errors as most workers across Australia do not experience a work-related injury or illness within the survey period. There is little ability to disaggregate to platform work (and to types of platform work) due to the sample size.
- National workers compensation data compiled by Safe Work Australia about serious injuries largely excludes contract platform workers, the vast majority of whom are not eligible for workers compensation as they are non-employees.
- From 2019, Safe Work Australia’s work-related traumatic injury fatality data includes platform drivers who were fatally-injured at work, but does not contain data about non-fatal injuries (Safe Work Australia, pers comms, 21 Dec 2022).

Platforms have more detailed proprietary data, including usage data from both workers and consumers, incident reporting (including successful and unsuccessful commercial insurance claims) and feedback from platform-formed safety groups. Worker representatives may also have information on safety that is not visible to the platform, because of the generally limited contact between platforms and workers outside of assigning tasks, resolving disputes or communicating through platform-formed worker safety groups. Insights from these types of data can be used by platforms to reduce hotspots of risk within their platforms. That said,

¹⁰⁹ Under s.7 of *Commercial Passenger Vehicle Industry Regulations 2018* (Vic)

some platforms do not have a systematic mechanism to collect injury data where such injuries or incidents fall outside of the scope of coverage of insurance policies.

Another approach may be to directly survey platform workers, drawing on a sufficient sample. For instance, NYC's Department of Consumer and Worker Protection collected data on occupational injuries (and on work expenses) through a survey distributed to all food delivery platform workers in NYC in the last quarter of 2021, using worker contact details collected from platforms (NYC Consumer and Worker Protection 2022, pp. 24–25). The survey concluded that food delivery platform workers on e-bikes and mopeds had the highest non-fatal injury rate of 32 days away from work per 100 full-time equivalent workers, followed by food delivery platform workers using cars, with a rate of 12.2 days away. These rates were higher than related occupations in the United States — couriers and messengers (2.2 days) and driver/sales workers (2.1 days) — and were higher than that of nursing assistants (10.2 days) and construction laborers (2.1 days).¹¹⁰

Policymakers should improve data collection on accidents and injuries for platform workers, including strengthening reporting to WHS regulators and clarifying what incidents are 'notifiable occurrences' by law. Better data will better inform WHS regulators about areas where safety outcomes can be improved.

Personal injury insurance is less generous than workers compensation

If offered at all, alternative forms of insurance provided by platforms or personal injury purchased by a worker are typically less generous than workers compensation (Safe Work Australia 2021b, p. 9).

Workers compensation generally allows workers to claim the full or partial cost of approved medical treatments (which can include treatments and appointments from medical practitioners and allied health, such as physiotherapy) and to access some reimbursement of medical expenses ('provisional expenses') while the claim is investigated (SIRA 2022a). In comparison, alternative forms of insurance are generally lump sum payouts, with the payout value depending on the type of injury and loss of bodily function and by insurance policy. Where alternative forms of insurance do provide income replacement, this is generally short term and at a smaller amount compared with workers compensation.

The lump sum death benefit — is generally higher under workers compensation compared with personal injury insurance provided by platforms. For instance, as of October 2022, the lump sum death benefit under the NSW workers compensation scheme is \$871 200 and is indexed twice-yearly (SIRA 2022b). As of April 2022, the death benefit under the policies arranged by Uber and Menulog were \$500 000 and up to \$585 000 (Select Committee on the Impact of Technological and Other Change on the Future of Work and Workers in New South Wales 2022, p. 92).¹¹¹

Moreover, most platforms consider that workers are 'working' *only* when they are actively completing a task, not when they are logged into the platform and searching for a task. For instance, Uber in its frequently asked questions for rideshare in the United Kingdom — where Uber drivers are legally considered 'workers', an intermediate category between employee and independent contractor — states that:

You earn the National Living Wage [the minimum wage in the United Kingdom] from the time you accept a trip on the app to the point at which the trip is completed: this is called the engaged time.

¹¹⁰ Nursing assistants and construction laborers were selected as comparators by the authors on the basis that 'nursing assistants ... have the highest rate of occupational injury in the U.S. of any major occupation' and that construction laborers were used as an 'illustrative example involving well-known risks' (NYC Consumer and Worker Protection 2022, pp. 24–25).

¹¹¹ The 'up to \$585 000' figure for Menulog is inclusive of funeral and dependant benefits. For the NSW workers compensation scheme and for the Uber policy, funeral and dependant or spousal benefits are in addition to the lump sum death benefit. Please visit the relevant platform's website for the details of the most up-to-date and official wording of their insurance policies.

Time waiting for a trip to be offered to you is not included in your National Living Wage calculation. This is because there is no requirement to accept any trips during this period. (Uber 2022a)

Where a worker is likely to be located when task-searching depends on the nature of their work — for instance, a rideshare worker is likely to be driving around, either on an existing task or if in a low-demand period, without a task, while a worker searching for clerical tasks is likely to be stationary and within an office or home setting.

Generally, personal injury insurance arranged by rideshare and food delivery platforms in Australia (where available) covers workers during task completion with a short grace period after a task is completed — it does not cover all times that a worker is online on a platform. For instance:

- Uber provides personal injury insurance that starts when a rideshare driver or food delivery worker accepts a task through the app and ends ‘15 minutes after that ride or delivery is completed or cancelled, whichever is earlier’ (Uber 2022c). At any other time, there is no coverage. There is also no coverage under the policy in the aforementioned 15-minute period if the worker has accepted another task from another platform unless the worker is also completing a task for Uber (Chubb 2022).
- Menulog provides personal injury insurance that starts when a food delivery worker accepts a task and ends ‘15 minutes following the completion of a Menulog delivery or if a courier or courier’s substitute undertakes any activity for remuneration unrelated to Menulog deliveries’ (Menulog nd).

The wording of insurance policies will ultimately determine what insurance obligations apply. While in traditional forms of work, a worker may only have work-related travel twice a day (to and from their workplace), those in ridesharing and food delivery platform work may be travelling to and from tasks, or searching for tasks while travelling, several times in a day. Even when a worker might consider themselves working by searching for a task while travelling in traffic, they might not be always covered by existing insurance. For instance:

- In April 2020, a NSW food delivery platform worker died as the result of a road accident and was not eligible for insurance coverage (which would have included a death benefit of \$400 000 to his family and funeral expense coverage). While the worker was logged into the app at the time of his death, he was only covered by insurance for 15 minutes after he had cancelled an order — his death had occurred 10 minutes after his coverage had lapsed under the eligibility criteria specified in the insurance policy (Begley 2021).
- In September 2020, a Victorian food delivery platform worker died as the result of a road accident (Burrows 2021b, p. 7). The time of death (and whether it was within the 15-minute window after the worker completed their final delivery) then became relevant in determining what were the platform’s insurance obligations (Burrows 2021b, p. 8).¹¹²

In Washington State, where rideshare drivers are eligible for workers compensation, coverage only applies during dispatch platform time — the time ‘a driver spends traveling from a dispatch location to a passenger pick-up location’ and passenger platform time (the time ‘when the driver is transporting one or more passengers on a trip’).¹¹³ There is no grace period after the completion or cancellation of a trip.

In California, Article 2 of Proposition 22 requires platforms to provide ‘occupational accident insurance to cover medical expenses and lost income resulting from injuries suffered while the app-based driver is online with a network company’s online-enabled application or platform’, not just when a platform worker is

¹¹² The platform later offered a cash payment of \$400 000 to a relative of the worker, but it is unclear from public information provided by the platform to the NSW Select Committee on the impact of technological and other change on the future of work and workers in New South Wales as to whether the death occurred within insurance coverage (Burrows 2021a, p. 5).

¹¹³ Engrossed Substitute House Bill 2076 (Washington State).

completing a trip or delivery request. As such, in California, Uber pays insurance premiums for Optional Injury Insurance coverage (while in other jurisdictions within the United States, premiums are deducted from worker earnings at a per mile rate during engaged time if a worker opts in (Uber nd).

Some platform workers lack information about insurance provisions

Insufficient insurance levels — or lack of worker knowledge about insurance coverage — is concerning in sectors where there are greater risks of harm or liability to the worker, customer or third parties that directly results from the performance of work, which could include aged care and ridesharing and food delivery.

In a 2019 national survey of platform workers (McDonald et al. 2019, p. 46):

- 46% of platform workers report that their main platform does not offer at least one form of work-related insurance
- 26% report that they do not know whether insurance is offered
- 40% of platform workers report that their main platform requires them to take out their own insurance
- 22% do not know whether there is a requirement for insurance.

Even when a platform worker knows that their platform provides insurance, they may not be aware of the full details of an insurance policy. There is likely to be a role for better information provision as there is no national platform work equivalent to the Fair Work Ombudsman's education function for employers and employees. For instance, in early 2023 Victoria will establish a Gig Worker Support Service that will provide information about platform conditions; maintain a list of platforms that have signed up to the voluntary Victorian standards for platform work; and help resolve disputes by making referrals to relevant federal and state agencies and community legal centres (Andrews 2022). The support service will also be available through translation and interpretation services.

Improving insurance arrangements in platform work with significant risk

In areas of platform work that bear significant risk to workers, and where insurance provision and outcomes are lacking, there are a number of options for policy. For many platform workers, public insurance provided through publicly-funded universal healthcare, the NDIS and social security benefits will be the major source of insurance, so that flaws in private arrangements mean that taxpayers bear many of the costs. Incomplete insurance also means that non-platform businesses — engaging workers as employees — providing services competing with platform workers may face a competitive disadvantage. The greater the risk, the more insurance benefits should approach those offered in workers compensation.

There have been various proposals to increase insurance coverage or the level of insurance for workers providing food delivery services. The options identified by the NSW State Insurance Regulatory Authority (SIRA) (2021a, pp. 4, 6–7) for improving insurance arrangements for food delivery platform work have likely broader applicability.¹¹⁴ Drawing on the SIRA proposals, there are three broad options that could inform arrangements for all types of platform work, though the choice of which may vary depending on the type of work. The options are:

¹¹⁴ SIRA noted that the risk profile of food delivery platform work is different from other platform work in part due to the use of bicycles, scooters or motorcycles, as well as the time pressures involved in food delivery work. This need not limit the application of these options to other platform work as insurance arrangements vary premiums based on risk.

- to **extend workers' compensation** — under workers compensation, platforms would pay premiums to insurers with workers injured during work filing claims under workers compensation. Platforms would also have 'return to work' obligations that they must fulfill
- **implementing an insurance scheme but not extending workers' compensation** — where there is an insurance scheme with features of workers compensation or compulsory third-party insurance
- **requiring platforms to provide a baseline level of personal injury insurance** — where minimum requirements are set by a government, with platforms required to source insurance meeting the standard for workers.

These options come with their own policy considerations (table 5.2) and are discussed in more detail in the following pages — though this is not a comprehensive review given the wide scope of the Productivity Inquiry. Any changes in policy relating to insurance arrangements should consider the demographics of platform workers affected (and their ability to navigate insurance claims and the legal system). For instance, SIRA (2021a) noted that food delivery workers were more likely to be from culturally and linguistically diverse backgrounds, have lower levels of education attainment and be temporary residents.

Table 5.2 – Considerations for insurance policy

Consideration	Workers compensation	Industry-wide scheme	Insurance baseline
Requires extension of 'deemed worker' status to class of platform workers in legislation (State governments can extend workers compensation eligibility to some contractors through workers compensation legislation)	Yes	No	No
Requires a definition of a class of platform worker to be codified in legislation, including consideration of multi-apping	Yes (in workers compensation legislation)	Yes (in legislation establishing an industry-wide platform work insurance scheme)	Yes (in legislation establishing a mandatory insurance baseline)
Requires definition of time-based insurance coverage for platform work to be codified in legislation or insurance policy wording (in which timeframes are platform workers eligible for coverage)	Yes (insurer will have to interpret whether an injury that occurs after a task is completed falls within travel-related provisions in state workers compensation legislation, additional guidance may have to be given in legislation or legislation may require amending)	Yes (in legislation establishing an industry-wide platform work insurance scheme)	Yes (for instance, if a government requires that platform insurance includes coverage for a short period of time after completing a task. The industry standard in food delivery is generally 15 minutes after completion, with some exceptions within policies)
Requires governments to define level of insurance benefits	Yes (if benefits are to be different than defined in existing legislation or if clarification is needed in legislation)	Yes (in legislation establishing an industry-wide platform work insurance scheme)	Yes (in establishing minimum standards for insurance)

Consideration	Workers compensation	Industry-wide scheme	Insurance baseline
Requires platforms to meet 'return to work' obligations (including creating a return to work plan, reasonable modifications to tasks to assist a worker in their return to work)	Yes (platforms as employers would have return to work obligations)	Depends on legislation	Depends on legislation
Requires governments to determine insurance benefits in legislation (including the existence of provisional payments while a claim is assessed)	No (would be subject to existing workers compensation legislation)	Yes (to determine insurance benefits and whether provisional payments exist)	Yes (to determine what the baseline level of insurance would entail, including if there are provisional payments mandated while a claim is processed)
Requires governments to determine how scheme or insurance meeting government requirements are funded	Yes (governments would need to maintain financial viability of workers compensation scheme)	Yes (in legislation establishing an industry-wide platform work insurance scheme)	No (insurance premiums paid by platforms would be priced by commercial insurers, although in practice, a government would need to consult with stakeholders to evaluate whether the parameters of their chosen insurance baseline would be commercially feasible)
Requires governments to design a dispute resolution process relating to a denied insurance claim	No (would follow established workers compensation dispute resolution processes, which involve conciliation and arbitration processes before legal proceedings)	Yes	No (would follow insurer's established dispute resolution process — generally involving escalation to a complaints team, internal review or both, before escalation to the Australian Financial Complaints Authority, an industry-funded dispute resolution scheme, before legal proceedings)

The system of workers compensation in Australia emerged and evolved during the 20th century — well before the advent of platform work. As such, any consideration to extend workers compensation would require that legislation be examined so that it is fit-for-purpose (such as how a measure of pre-injury average weekly earnings is calculated accounting for the potential of high variability in earnings over the span of weeks or months in some forms of platform work).

Furthermore, WHS matters have traditionally been considered as primarily state and territory responsibilities. WHS regulators are largely state-based, the model WHS laws are implemented through state legislation and with the exception of Comcare, workers compensation schemes are operated at a state level. As there are differences between states for insurance requirements and workers compensation eligibility, a problem from moving to better coverage through state-based WHS arrangements would be inconsistencies in the treatment of workers undertaking the same tasks and facing the same risks. This would create some compliance burdens for platforms.

One approach that *could* create a nationally consistent approach would be the use of mirror laws by states if all (or most) states agreed to a consistent approach to insurance for high-risk platform work, such as food delivery, similar to how model WHS laws already apply across all jurisdictions bar Victoria.

Defining classes of platform workers for insurance purposes

As there are no insurance requirements in the IC Act and as most contract platform workers are not currently eligible for workers compensation, any changes to require an insurance baseline, creating an industry-wide insurance scheme or extending workers compensation eligibility requires that there be a precise definition of classes of platform workers to avoid boundary issues with non-platform contract work. In the case of an industry-wide scheme or extending workers compensation, policymakers need to consider overlaps with other types of platform work if it is possible to simultaneously complete or progress more than one type of task (for instance, ridesharing and food delivery).

Legislating regulating platform work has involved codifying definitions of platforms and workers.¹¹⁵ Platform definitions often reference the online nature of task assignment and the type of tasks dispatched by a platform, with platform workers being defined in reference to platforms. For ridesharing, legislation may clarify that taxi services and limousine hire are not within scope of regulation when they are regulated separately.

What level of insurance benefits should be available?

If workers compensation were to be extended, the benefits available to a platform worker would follow that prescribed by existing legislation. Policymakers would also need to consider how income from other contracting platform work — in work that is not eligible for coverage under a state's workers compensation scheme — is treated for the purposes of calculating an average measure of pre-injury average weekly earnings. Otherwise, governments would need to determine what level of insurance benefits are sufficient — either in mandating a baseline level of insurance or in creating an industry-wide insurance scheme — including whether (and to what extent):

- lump-sum benefits are provided for fatalities (including death benefits and funeral expenses) and injuries
- medical expenses are reimbursed
- there are limits on out of pockets expenses
- there is an income replacement scheme
- there are payments to a worker's dependants upon death.

An industry-wide insurance scheme that differs from workers' compensation will also need to consider how provisional payments work while the claim is being processed and in turn, performance targets for the time it takes to process a claim. For instance, in New South Wales, after receiving initial notification of an injury under workers compensation, insurers must start provisional payments within 7 days unless there is a reasonable excuse not to (SIRA 2021b).

Under workers' compensation, platforms would have 'return to work' obligations

Under an extension of workers compensation, there are return to work obligations for organisations engaging or employing deemed workers, although these obligations vary by state. These obligations include making a personalised return to work plan for injured workers and investing work modifications for injured workers (for instance, if light duties are available). At an organisational level, it may mean appointing a return to work

¹¹⁵ For instance, as defined in Ontario's Digital Platform Workers' Rights Act 2022 (broad regulation of platform work), New York City's high-volume for hire services in subchapter 59D of the Rules of the City of New York (ridesharing) and subchapter 2 of chapter 15 of title 20 of the administrative code of New York City (food delivery platform work) and Washington State's Engrossed House Bill 2076 (ridesharing).

coordinator and creating and publicising a return to work strategy or program. For instance, in New South Wales, Tier 1 organisations — which some platforms could be categorised even based on the number of existing employees — must consult workers and any unions that represent them during the creation of the return to work program (SIRA 2022c).

Financial viability of an industry-wide insurance scheme or extending workers compensation for classes of platform work with significant risk

The financial viability of creating an industry-wide insurance scheme or to extend workers compensation for a class of high-risk platform work — such as food delivery — would need to be considered, particularly in how premiums are priced, given differences in platform work. Some platform workers will work the equivalent of full-time hours, while others may only work a few hours. One proposal considered by the NSW Government in 2021, which has not been enacted, was to fund an insurance scheme for food delivery workers through imposing a levy of about 4% on each eligible platform transaction — though the levy could have varied ‘depending on the service or platform’ (Cormack 2021).

In designing an insurance scheme, policymakers would need to consider (SIRA 2021a, p. 7):

- the relative costs and benefits associated with private or public underwriting
- the ability to implement principles of insurance pricing, such as risk-based pricing, risk pooling, price stability, and to encourage risk management by parties with the aim of lowering future claims (referred to as ‘good claims performance’)
- the ability to accurately price insurance premiums or levies to reflect risk in specific platform work
- the interactions of a proposed scheme with existing public and private insurance schemes
- additional administration costs — for instance, if a government were to create a separate industry-wide insurance scheme for classes of platform workers.

Though not direct comparators for Australian cities, examples of funding arrangements for workers compensation funding for ridesharing include:

- in New York State, where high-volume rideshare platforms pay into the Black Car Fund, a workers compensation fund for the taxi, limousine hire and ridesharing industry. In June 2022, Uber stated that trips in New York incurred a surcharge of 3% to pay for workers compensation (Uber 2022b)
- in Washington State, rideshare platforms pay into the state’s workers compensation fund. The premiums paid by businesses are determined by a formula involving a base rate, the number of hours worked, and risk and experience ratings (Washington State Department of Labor & Industries 2020).

Dispute resolution for denied claims in an industry-wide insurance scheme

Governments would need to consider the desirable dispute resolution processes for any industry-wide insurance scheme. Under Comcare and state-based workers compensation schemes, there are review and conciliation processes that a worker can elect to use before pursuing their claim through court (or through arbitration processes, where they exist). For instance, in Victoria, conciliation involves the WorkCover agent, the employer and the worker who meet in a conference with a Conciliation Officer to attempt to resolve the dispute. If a Genuine Dispute Certificate is provided after an unsuccessful conciliation conference, the worker can apply for binding arbitration by the Workplace Injury Commission — which in limited circumstances, can be appealed to the Supreme Court of Victoria — or to initiate court proceedings.

Under commercial insurance arrangements, if a claim is denied there are generally internal complaint and dispute resolution processes that a worker can use to appeal a denied claim. If unsuccessful, a worker can escalate a dispute about a denied claim to the Australian Financial Complaints Authority (AFCA) (an external

dispute resolution body for the financial services industry) with powers to offer a binding determination to the worker, if conciliation fails. Otherwise, if a worker disagrees with the binding determination proposed by AFCA, they can pursue the claim through court.



Recommendation 7.19

Evaluate insurance arrangements for platform work with significant risks to workers

Governments should evaluate insurance arrangements of classes of platform work where there are significant risks to worker safety, drawing on data and consultation with platforms, workers and their representatives. Classes of platform work that are likely to be of initial interest are those with many workers or total hours worked and those where there are material risks to work health and safety.

Where insurance arrangements are insufficient, governments should consider at minimum mandating a baseline level of insurance to be provided and paid for by platforms, or creating an industry-wide insurance scheme, or extending workers compensation. Each of the policy options would be best funded by the covered platforms. The appropriate policy option will depend on the class of platform work and its risks, and implementation considerations such as the existing level of insurance provided by platforms and the financial sustainability of the scheme.

Appendix

A. Stylised simulations of economy-wide effects

The Productivity Commission used a whole-of-economy model to illustrate the potential effects of some of the recommendations in this report in a stylised way. This model is static, in that it does not capture dynamic effects over time. Rather, the results are interpreted as if the effects of a shock to the economy could happen overnight. While the simulations are stylised and there is a high level of uncertainty in the impacts of the proposed recommendations and other model assumptions, the simulations provide insight on how potential productivity improvements could flow through the economy's structure and the differential impacts across industries and household types. Further details of the model, simulations and effects of sensitivity testing are contained in volume 9.

Improving matching of permanent skilled migration¹¹⁶

While migrants are not separately identified as an individual labour type in the whole-of-economy model used in this inquiry, the effects of better matching permanent skilled migrants to jobs were simulated in a stylised way by increasing labour productivity in industries based on the extent to which they employ skilled migrants. The composition of the population (in terms of age group, sex and education level) in the simulation stayed the same — the assumption is that the size and composition of the permanent migration intake does not change, but the skills of migrants can be better utilised in the industries they are employed in. Industries employing a relatively higher share of workers with permanent skilled visas received a larger productivity improvement, with simulated labour productivity increases (relative to baseline labour productivity) of:

- 0.1% for 'construction', 'retail trade', 'hospitality', 'school education', 'public administration', 'other services'
- 0.2% for 'mining', 'other manufacturing', 'transport and wholesale', 'financial services', 'professional, scientific and technical services', 'health and social services'
- 0.3% for 'advanced manufacturing', 'technical, vocational and tertiary education'
- 0.6% for 'technology and telecommunications'.

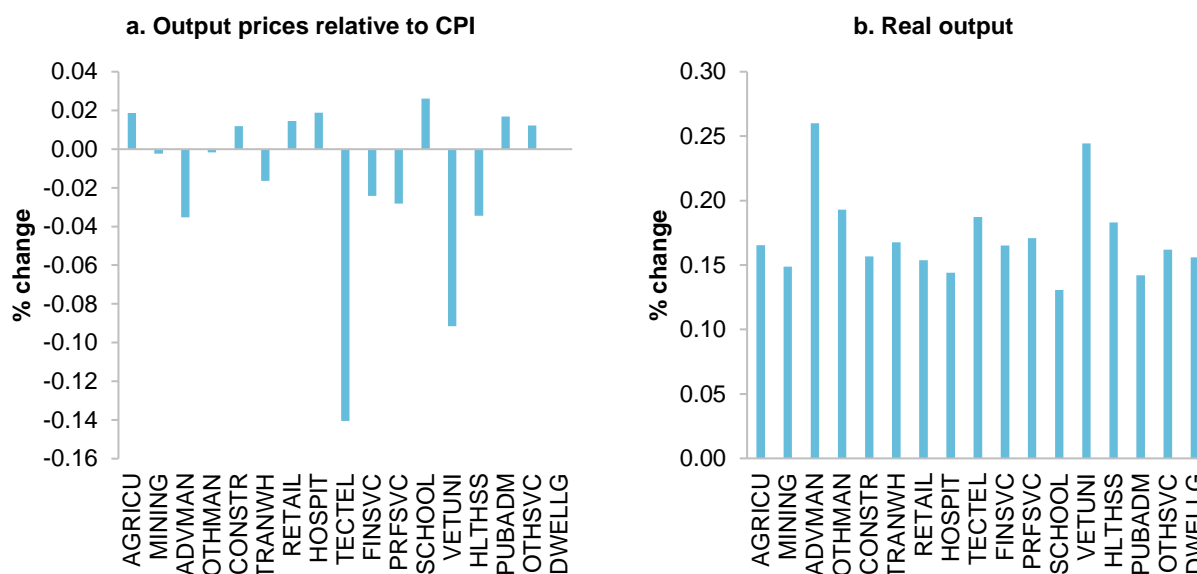
The change in prices relative to the economy-wide consumer price index (CPI) varied across the different industries. Industries with larger simulated labour productivity increases (including 'advanced manufacturing', 'technology and telecommunications', and 'technical, vocational and tertiary education') were better able to produce more output with the same amount of labour, and therefore experienced the largest reduction in their relative output prices (figure A.1, panel a). In some other industries with smaller simulated labour productivity improvements, the effects of increased demand (discussed below) on prices outweighed price falls from the increase in labour productivity, which led to a relative increase in prices.

Real output increased across these industries as the relative price changes induced greater demand. Real output increased across other industries as well, including those that did not experience a simulated productivity improvement (figure A.1, panel b). The overall demand increase across industries was due to

¹¹⁶ Referred to as simulation 7 in volume 9.

factors such as higher household incomes (elaborated on below), the need for more capital for production (and hence investment), and an increase in government expenditure (which was tied to the size of GDP). Real GDP and real gross national income increased by about 0.2% in the simulation. There was high uncertainty about the size of the effects; for example, sensitivity testing found that the increase in real GDP ranged from about 0.1 to 0.3% with changes to assumed shock sizes (chapter 4 in volume 9).

Figure A.1 – Estimated changes in output prices and real output by industry due to improved matching of permanent skilled migration^a



a. Industry abbreviations: AGRICU – agriculture, forestry and fishing; MINING – mining; ADVMAN – advanced manufacturing; OTHMAN – other manufacturing; CONSTR – construction; TRANWH – transport and wholesale; RETAIL – retail trade; HOSPIT – hospitality; TECTEL – technology and telecommunications; FINSVC – financial services; PRFSVC – professional, scientific and technical services; SCHOOL – school education; VETUNI – technical, vocational and tertiary education; HLTHSS – health and social services; PUBADM – public administration; OTHSVC – other services; DWELLG – ownership of dwellings. Source: Productivity Commission estimates.

Although the industries with larger simulated productivity improvements required less labour, overall labour use in the economy was largely unchanged as workers were redeployed across other industries that experienced growth in demand. In the migration context, the simulation implies that more productive migrants in certain industries displace other workers, but the subsequent effects of these productivity improvements on demand and economic growth mean that displaced workers find employment in other industries (abstracting from skill or location mismatches that may occur in reality and take some time to resolve). This displacement occurs because there is no differentiation between migrant and local workers in this model, so the two are perfectly substitutable, given the same age, sex and education characteristics. However, if migrant workers were considered complementary to local workers rather than substitutes (for example, due to different knowledge and skillsets that complement the skills of local workers), then increased productivity of migrant workers in a particular industry may lead to increased demand for local workers in that industry as well.¹¹⁷

¹¹⁷ The Productivity Commission’s *Migrant Intake into Australia* inquiry (PC 2016b, p. 191) suggested that at an aggregate level, taking together supply and demand effects, the addition of new migrants to Australia’s population have had a negligible impact on

The overall increase in demand for labour increased real average wage rates (that is, wages relative to the economy-wide CPI) in the economy. Higher real household labour and capital incomes (which more than offset increased household saving and income taxes), contributed to higher household consumption and improved wellbeing. These effects were seen across people of different age groups, genders and education levels. The aggregate value of the wellbeing improvement was estimated to be worth about \$1.7 billion in 2018-19 dollars to households.

Reducing unnecessary occupational licensing requirements¹¹⁸

Reducing unnecessary licensing requirements would improve labour mobility and therefore enable better matching of jobs to people with the most suitable skills for the role. The impacts of this change were simulated by increasing labour productivity in the model. While occupational licensing affects *occupations* rather than *industries*, the limitations of the model's structure meant that the labour productivity improvements could only be simulated by industry. The simulated labour productivity improvements were applied to industries that are most likely to have occupational licensing requirements, and hence would benefit most from reducing unnecessary ones. In the simulation, it was assumed that each unit of labour (measured by hours worked) in the 'construction', 'transport and wholesale', 'professional, scientific and technical services', 'school education' and 'health and social services' industries was 0.8% more productive.

Improving labour productivity in the simulated industries led to a fall in labour hours required to produce the same amount of output in those industries. This contributed to a reduction in prices of those industries' goods and services relative to the economy-wide CPI, with the greatest reductions in the most labour-intensive industries (figure A.2, panel a).

The relative price falls induced greater demand in industries that experienced improved labour productivity. Output also increased more broadly across the economy, including in industries that did not directly experience an increase in labour productivity (figure A.2, panel b). This was due to growth in real household incomes, the need for more investment to meet greater demand for capital in all industries, and growth in government expenditure (which was tied to GDP). Real GDP increased by 0.3% and real gross national income increased by 0.4%. Sensitivity testing found that the change in real GDP ranged from 0.1 to 0.7% under changes to assumed shock sizes, demonstrating the uncertainty in these effects (chapter 4 in volume 9).

Hours worked in the industries with simulated productivity increases fell, but hours worked in industries that did not have a simulated increase in labour productivity increased due to greater demand. The net effect across all industries was such that total hours worked was largely unchanged. Falls in labour hours were largely for groups aged 65 and over, who chose to spend more time on leisure — labour supplied by these older age groups were calibrated in the model to be more responsive to income changes than other age groups. Hours worked among all younger age groups increased on average.

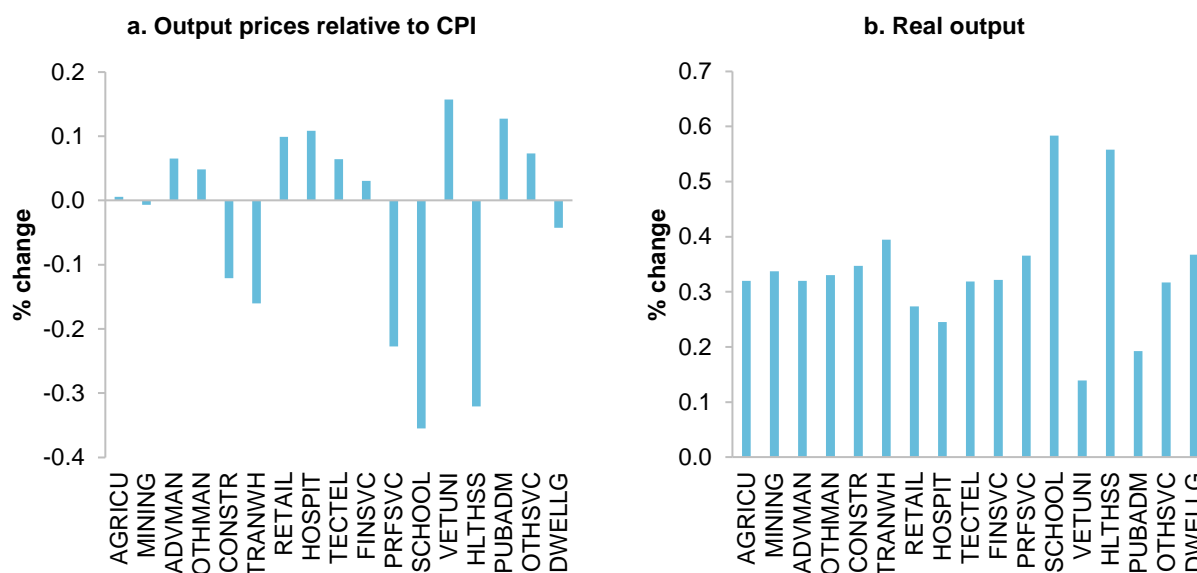
Across all groups, real disposable incomes increased (as real labour and capital income increases exceeded increases in saving and income tax), and households were able to consume more. The combined effects of greater consumption and increased leisure time for older groups meant that household wellbeing improved for all age groups, genders and education levels. The aggregate value of the increase in household wellbeing was

wages, employment and participation of the existing labour force. The size of migrant spillover effects on the productivity of local workers (which could arise from transfers of knowledge and exposure to new opportunities) were uncertain but likely small.

¹¹⁸ Referred to as simulation 6 in volume 9.

estimated to be about \$3.3 billion in 2018-19 dollars (that is, if this amount was given as extra income instead of the productivity shock, households would be as well off as they were estimated to be after the productivity shock).

Figure A.2 – Estimated changes in output prices and real output by industry due to reducing unnecessary occupational licensing^a



a. Industry abbreviations: AGRICU – agriculture, forestry and fishing; MINING – mining; ADVMAN – advanced manufacturing; OTHMAN – other manufacturing; CONSTR – construction; TRANWH – transport and wholesale; RETAIL – retail trade; HOSPIT – hospitality; TECTEL – technology and telecommunications; FINSVC – financial services; PRFSVC – professional, scientific and technical services; SCHOOL – school education; VETUNI – technical, vocational and tertiary education; HLTHSS – health and social services; PUBADM – public administration; OTHSVC – other services; DWELLG – ownership of dwellings.

Source: Productivity Commission estimates.

There are some limitations to the approach of modelling reduced occupational licensing requirements by increasing labour productivity in specific industries. It is likely that there are some occupations that would be affected by occupational licensing changes that are not covered by these industries. Conversely, some occupations in these industries would not be affected by these changes.

In addition, modelling only increases in industry labour productivity abstracts from other effects that could arise from removing unnecessary occupational licensing requirements. As discussed in chapter 3, licence requirements can also lead to wage premiums and reduce the equilibrium labour supply in affected occupations. These effects were not modelled under this simulation as the inquiry’s whole-of-economy model does not contain industry- or occupation-specific wages, with labour assumed to be perfectly mobile across industries. Sensitivity analysis of the effects of simulated productivity improvements in the presence of *economy-wide* wage floors and unemployment suggest that there could be greater gains in labour hours and production (discussed in chapter 4 in volume 9).

Reforms to awards and enterprise bargaining

Reforms to awards will allow significantly greater scope for flexibility in workplaces, reinforced by changes to the modern awards objective, which explicitly references productivity as a goal. Award changes reverberate across all other types of workplace relations as they form the minimum standards for many industries or occupations. To that extent, award reforms act to increase efficiency of labour markets across the whole economy. Independently,

changes in bargaining arrangements, especially changes to the better-off-overall-test and closer scrutiny of any clauses to agreements that overly restrict management's investment or other key business decisions will also improve productivity and encourage the uptake of enterprise bargaining.

Given the general impacts of workplace reform across the economy, the appropriate shock is a general shock to labour productivity, as modelled for the very long run reforms of the schooling system (in appendix B from volume 8).¹¹⁹ It is unlikely that the workplace relations reforms proposed in this review will produce the same productivity improvements, so the results for school reform should be scaled down. Assuming a scaling factor of between 0.10 to 0.25, the gains to real GDP would be of an order between 0.2 and 0.5 percentage points.

The Productivity Commission's 2015 report (PC 2015c) was a broader review of the entire workplace relations system compared with the tighter focus of this report. The 2015 report raised other potential changes to workplace relations in relation to industrial action, adverse action, unfair dismissal, governance arrangements, greenfield agreements, and individual flexibility agreements, among others. These changes would produce some additional benefits.

¹¹⁹ Referred to as simulation 5c in volume 9. This simulation assumed a 2% labour productivity improvement across the population, and an additional 3% labour productivity improvement in the 'school education' industry. The estimated real GDP effect of 2% was predominantly due to the former.

Abbreviations

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACCI	Australian Chamber of Commerce and Industry
ACTU	Australian Council of Trade Unions
AFCA	Australian Financial Complaints Authority
AHPRA	Australian Health Practitioners Regulation Agency
Ai Group	Australian Industry Group
AMR	Automatic mutual recognition
ANMAC	Australian Nursing and Midwifery Accreditation Council
ANZSCO	Australian and New Zealand Standard Classification of Occupations
ANZSIC	Australian and New Zealand Standard Industrial Classification
API	Application programming interface
ASIC	Australian Securities and Investments Commission
ASU	Australian Services Union
ATO	Australian Taxation Office
BCA	Business Council of Australia
BIIP	Business Innovation and Investment program
BLADE	Business Longitudinal Analysis Data Environment
BOOT	Better Off Overall Test
CBA	Cost-benefit analysis
CCA	Competition and Consumer Act, 2010 (Cth)
CEDA	Committee for Economic Development of Australia
CFMEU	Construction, Forestry, Maritime, Mining, and Energy Union
COVID-19	Coronavirus disease (an infectious disease caused by the SARS-CoV-2 virus)
CPD	Continuous professional development
CSAM	Continuous Study of Australian Migrants
CTP insurance	Compulsory third party insurance
DEWR	Department of Employment and Workplace Relations
EA	Enterprise agreement
ECEC	Early childhood education and care
EMTR	Effective marginal tax rate

EV	Electric vehicle
FDI	Foreign direct investment
FTA	Free trade agreement (also referred to as a preferential trade agreement)
FW Act	Fair Work Act, 2009 (Cth)
FWC	Fair Work Commission
FWCFB	Full Bench of the Fair Work Commission
FWO	Fair Work Ombudsman
GBE	Government Business Enterprise
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GP	General practitioner
HILDA	Household Income and Labour Dynamics in Australia
IT	Information Technology
IC Act	Independent Contractors Act 2006 (Cth)
ICT	Information and Communication Technology
IPART	Independent Pricing and Regulatory Tribunal
MADIP	Multi-Agency Data Integration Project
MBS	Medicare Benefits Schedule
NCC	National Construction Code
NDIA	National Disability Insurance Agency
NDIS	National Disability Insurance Scheme
NES	National Employment Standards
NMBA	Nurses and Midwifery Board of Australia
NP	Nurse practitioner
NRAS	National Accreditation and Registration Scheme
NYC	New York City
OBA	Outcomes-based assessment
OECD	Organisation for Economic Co-operation and Development
OER	Occupational entry regulation
OSAP	Offshore Skills Assessment Program
OHS	Occupational Health and Safety
PBS	Pharmaceutical Benefits Scheme
PC	Productivity Commission
PCBU	Person conducting a business or undertaking
RAC	Refrigeration and air conditioning
RIS	Regulatory impact statement

Regtech	Regulatory technology
SCHADS Award	Social, Community, Home Care and Disability Services Award
TSS	Temporary Skill Shortage
TSMIT	Temporary Skilled Migration Income Threshold
TWU	Transport Workers' Union
TTMRA	Trans-Tasman Mutual Recognition Agreement
UFCW	United Food and Commercial Workers Canada
UK	United Kingdom
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
UTI	Urinary tract infection
WHS	Workplace Health and Safety
WR	Workplace Relations
WWCC	Working With Children Check

References

- ABS (Australian Bureau of Statistics) 2022a, *Employee Earnings and Hours, Australia, May 2021*, Cat. no. 6306.0, Canberra.
- 2022b, *Labour Force, Australia, August 2022*.
- 2022c, *Labour Force, Australia, December 2021*.
- 2022d, *Labour Force, Australia, Detailed*, Cat. no. 6291.0.55.001.
- 2022e, *Overview of ABS activity to measure digital platform workers*, October, Canberra.
- 2022f, *Trade union membership, August 2022*.
- ACCC (Australian Competition and Consumer Commission) 2014, *Determination Application for authorisation lodged by Transport Workers' Union of Australia Queensland Branch on behalf of owner drivers in respect of collective bargaining with Toll Transport Pty Ltd for services at the Toll Priority Brisbane Branch*, 16 October, A91427, Canberra.
- 2019, *Guidelines for Authorisation of conduct (non-merger)*, March, Canberra.
- 2020, *Perishable agricultural goods inquiry*, November.
- 2021, *Collective bargaining class exemption - Guidelines*, Canberra.
- Accenture 2021, *Making delivery work for everyone*, Sydney.
- ACCI (Australian Chamber of Commerce and Industry) 2018, *Submission to the Senate Select Committee on Red Tape*, May.
- 2023, *Planning Australia's 2023-24 Migration Program*, Submission.
- ACSQHC (Australian Commission on Safety and Quality in Health Care) 2015, *Credentialing health practitioners and defining their scope of clinical practice: A guide for managers and practitioners*.
- 2018, *Antimicrobial Stewardship in Australian Health Care*.
- ACTU 2022a, *Skilling the Nation: Addressing Australia's skills and migration needs now and into the future*, www.actu.org.au/media/1450098/actu-job-summit-report-skilling-the-nation.pdf (accessed 13 January 2023).
- 2022b, *Senate Inquiry into the Secure Jobs Better Pay Bill 2022 - ACTU Submission*, 11 November.
- Aglio, D. and di Mauro, F. 2020, *Decentralisation of collective bargaining: A path to productivity?*, IWH-CompNet Discussion Papers 3/2020, Halle Institute for Economic Research (IWH).
- Ai Group 2021, *National Safety Principles for Food Delivery Platforms*, July.
- 2022a, *Application to vary the Clerks – Private Sector Award 2020 Further Submission (AM2022/8)*.
- 2022b, *2022 Federal Election Policy Statements Workplace Relations Policy - The Safety Net of Minimum Conditions*, 20 February, Sydney.
- AIHW (Australian Institute of Health and Welfare) 2021, *Medicare-subsidised services, by Statistical Area Level 3 (SA3): 2020-21*.
- 2022, *Health workforce*.
- Airtasker 2022, *What is Airtasker's dispute process?*, Airtasker Help Centre, <https://support.airtasker.com/hc/en-au/articles/360001291168-What-is-Airtasker-s-dispute-process-> (accessed 5 December 2022).
- Alexander, D. and Schnell, M. 2019, 'Just what the nurse practitioner ordered: Independent prescriptive authority and population mental health', *Journal of Health Economics*, vol. 66, pp. 145–162.
- Alexander, O., Borland, J., Charlton, A. and Singh, A. 2022, 'Uber down under: The labour market for drivers in Australia', *Australian Economic Review*, vol. 55, no. 1, pp. 177–194.
- Allsup, M. 2021, 'Prop. 22 Backers Appeal Ruling Striking California Gig Work Law', *Bloomberg*, 23 September.
- AlphaBeta 2019, *Flexibility and fairness: What matters to workers in the new economy*.
- Amazon nd, *Amazon Flex*, <https://flex.amazon.com.au/earnings> (accessed 23 January 2023).
- Anderson, D.M., Brown, R., Charles, K.K. and Rees, D. 2016, *The Effect of Occupational Licensing on Consumer Welfare: Early Midwifery Laws and Maternal Mortality*, July, w22456, National Bureau of Economic Research.
- Andrew, M. 2017, *Black Economy Taskforce Final Report - October 2017*, Black Economy Taskforce, Canberra.
- Andrews, D. (Premier of V. 2022, *Increasing Fairness And Support For Victorian Gig Workers*, Media Release, 21 Oct.
- Australian Government 2008, *Fair Work Bill 2008 Explanatory Memorandum*.
- 2022a, *Annual Progress Report 2022: Implementation of recommendations from the Final Report of the Royal Commission into Institutional Responses to Child Sexual Abuse*.
- 2022b, *Fair Work Legislation Amendment (Secure Jobs, Better Pay) Bill 2022 Revised Explanatory Memorandum*.
- 2022c, *Fair Work Legislation Amendment (Secure Jobs, Better Pay) Bill 2022 Supplementary Explanatory Memorandum*.
- Australian Medical Association 2021, *AMA submission on Nurse Practitioner 10 Year Plan Consultation Paper*.
- Ball, J. 2022, *Australia's Future Migration System*, CEDA.
- Bambalaite, I., Nicoletti, G. and von Rueden, C. 2020, *Occupational Entry Regulations and Their Effects on Productivity in Services: Firm-Level Evidence*, OECD Economics Department Working Papers, 31 March 1605.
- BCA (Business Council of Australia) 2022, *A Migration System for Australia's Future: Submission*, https://assets.nationbuilder.com/bca/pages/7157/attachments/original/1673222070/BCA_Submission_-_A_Migration_System_for_Australias_Future.pdf?1673222070 (accessed 10 January 2023).
- Beahm, N.P., Smyth, D.J. and Tsuyuki, R.T. 2021, 'Antimicrobial utilization and stewardship in patients with uncomplicated urinary tract infections managed by pharmacists in the community: A sub-study of the RxOUTMAP trial', *Journal of the Association of Medical Microbiology and Infectious Disease Canada*, vol. 6, no. 3, pp. 205–212.
- Begley, P. 2021, 'Uber Eats sent three delivery requests to Burak. He was alive for the first one', *ABC News*, 24 June.
- Bellon, T. 2022, 'Uber, Canadian union reach deal to support gig worker benefits, flexibility', *Reuters*, 27 January.

- Bennett, B., Carney, T., Chiarella, M., Walton, M., Kelly, P., Satchell, C. and Beaupert, F. 2018, 'Australia's National Registration and Accreditation Scheme for Health Practitioners: A National Approach to Polycentric Regulation', *Sydney Law Review*, vol. 40, no. 2, pp. 159–182.
- Black, S. and Chow, E. 2022, 'Job Mobility in Australia during the COVID-19 Pandemic', *Reserve Bank of Australia Bulletin*, June, pp. 24–34.
- Blair, P.Q. and Chung, B.W. 2019, 'How much of barrier to entry is occupational licensing?', *British Journal of Industrial Relations*, vol. 57, no. 4, pp. 919–943.
- Boland, M. 2018, *Review of the model Work Health and Safety laws Final report*, December.
- Bonyhady, N. 2022, 'Delivery rider's family wins landmark payout after death', *The Sydney Morning Herald*, 22 June.
- Borjas, G. 1999, 'The economic analysis of immigration', *Handbook of Labour Economics*, vol 3, Elsevier Science B.V.
- Boulhol, H. and Turner, L. 2009, *Employment-Productivity Trade-off and Labour Composition*, 14 May, OECD, Paris.
- Boyton, A. 2022, *Australian Business Economists Speech by the National Skills Commissioner*, 14 February.
- Breadon, P. and Romanes, D. 2022, *A new Medicare: strengthening general practice*, December, The Grattan Institute.
- Brell, C. and Dustmann, C. 2019, 'Immigration and wage growth: The case of Australia', presented at RBA Conference Papers acp2019–05, Reserve Bank of Australia.
- Breunig, R., Deutscher, N. and To, H.T. 2017, 'The relationship between immigration to Australia and the labour market outcomes of Australian-born workers', *Economic Record*, vol. 93, no. 301, pp. 255–276.
- and Rose, T. 2019, *Public Policy and the Economics of Minimum Wages*, Case study prepared for Economics of Government, Crawford School of Public Policy, Canberra.
- Broadway, B. and Wilkins, R. 2017, *Probing the Effects of the Australian System of Minimum Wages on the Gender Wage Gap*, Melbourne Institute Working Paper, no. 31/17, 31/17, Melbourne Institute of Applied Economic and Social Research, Melbourne.
- van der Broeke, L. 2016, 'No guards aboard Sydney's future trains', *Daily Telegraph*, 29 July.
- Burgel, B.J., Gillen, M. and White, M.C. 2012, 'Health and Safety Strategies of Urban Taxi Drivers', *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, vol. 89, no. 4, pp. 717–722.
- Burrows, R. 2021a, *Answers to Questions on Notice Doordash - received 7 October 2021*, 7 October.
- 2021b, *Virtual hearing via video conference on Friday 10 September 2021*, p. 3.
- Bužančić, I., Kummer, I., Držaić, M. and Ortner Hadžiabdić, M. 2022, 'Community-based pharmacists' role in deprescribing: A systematic review', *British Journal of Clinical Pharmacology*, vol. 88, no. 2, pp. 452–463.
- Carter, J., Hoffman, M. and Foster, S. 2019, *Opal Tower investigation final report*, February.
- Cash, M. 2015, *Allegations of worker exploitation*, Media release, 5 May.
- CEDA 2019, *Effects of temporary migration*, https://cedakenticomedia.blob.core.windows.net/cedamediacontainer/kentico/media/general/publication/pdfs/190709_cedatemporarymigration_fullreport_final_1.pdf (accessed 21 September 2022).
- 2021a, *A good match: Optimising Australia's permanent skilled migration*.
- 2021b, *Duty of care: meeting the aged care workforce challenge*, Melbourne.
- 2022a, *Send migration signal to compete in global talent war - Reinvigorating Australia's post-pandemic immigration system requires a dedicated, deliberate and persistent strategy*, <https://www.ceda.com.au/NewsAndResources/Opinion/Economy/Send-migration-signal-to-compete-in-global-talent> (accessed 27 June 2022).
- 2022b, *Jobs & Skills Summit: unlocking skilled migration*, <https://cedakenticomedia.blob.core.windows.net/cedamediacontainer/kentico/media/attachments/jobs-paper-template-final1.pdf> (accessed 23 September 2022).
- 2022c, *Skills Recognition*.
- Chee, F.Y. 2022, 'EU lawmakers agree to tougher draft gig labour rules', *Reuters*, 12 December.
- Chiarella, M., Currie, J. and Wand, T. 2020, 'Liability and collaborative arrangements for nurse practitioner practice in Australia', CSIRO, Collingwood, Australia, *Australian Health Review*, vol. 44, no. 2, pp. 172–177.
- Chief Nursing and Midwifery Officers Australia 2020, *Advanced Nursing Practice: guidelines for the Australian context*.
- Chubb 2022, *Uber Personal Accident - Coverage Summary, Australia*, November.
- Clark, S., Parker, R., Prosser, B. and Davey, R. 2013, 'Aged care nurse practitioners in Australia: evidence for the development of their role', CSIRO, Collingwood, Australia, *Australian Health Review*, vol. 37, no. 5, pp. 594–601.
- COAG Health Council 2015, *Communique - A National Code of Conduct for health care workers*, April.
- Coates, B. and Reysenbach, T. 2022, *The Goldilocks wage threshold for temporary skilled migrants*, Grattan Institute, <https://grattan.edu.au/news/the-goldilocks-wage-threshold-for-temporary-skilled-migrants/> (accessed 10 January 2023).
- , Sherrell, H. and Mackey, W. 2021, *Rethinking permanent skilled migration after the pandemic*, Grattan Institute.
- , — and — 2022, *Fixing temporary skilled migration: A better deal for Australia*, Grattan Institute.
- , Wiltshire, T. and Reysenbach, T. 2022, *Australia's migration opportunity: how rethinking skilled migration can solve some of our biggest problems*, The Grattan Institute.
- Colaert, V. 2018, *RegTech as a response to regulatory expansion in the financial sector*, <https://www.law.ox.ac.uk/business-law-blog/blog/2018-07/regtech-response-regulatory-expansion-financial-sector> (accessed 21 July 2022).
- Cormack, L. 2021, 'Delivery levy to add 88 cents per order to protect drivers', Sydney, *The Sydney Morning Herald*, 4 March.
- Criddle, C. 2022, 'Deliveroo faces fresh UK Supreme Court challenge over riders' rights', *Financial Times*, 5 September.
- Criscuolo, C., Gal, P., Leidecker, T. and Nicoletti, G. 2021a, *The human side of productivity: Uncovering the role of skills and diversity for firm productivity*, OECD Productivity Working Papers, No. 29, OECD Publishing, Paris.
- , Hijzen, A., Koelle, M., Schwellnus, C., Barth, E., Fabling, R., Fialho, P., Garloff, A., Grabska, K., Kambayashi, R., Murakozy, B., Skans, O.N., Nurmi, S., Stadler, B., Upward, R. and Zwysen, W. 2021b, *The firm-level link between productivity dispersion and wage inequality: A symptom of low*

- job mobility?*, OECD Social, Employment and Migration Working Papers, No. 258.
- Crommelin, L., Thompson, S., Easthope, H., Loosemore, M., Yang, H., Buckle, C. and Randolph, B. 2021, *Cracks in the Compact City: Tackling defects in multi-unit strata housing*, October, UNSW, Sydney.
- Crown, D., Faggian, A. and Corcoran, J. 2020, 'High skilled immigration and the occupational choices of native workers: the case of Australia', *Oxford Economic Papers*, vol. 72, no. 3, pp. 585–605.
- Currie, J., Chiarella, M. and Buckley, T. 2017, 'Collaborative arrangements and privately practising nurse practitioners in Australia: results from a national survey', CSIRO, Collingwood, Australia, *Australian Health Review*, vol. 41, no. 5, pp. 533–540.
- DAE (Deloitte Access Economics) 2018, *Seizing the opportunity: Making the most of the skills and experience of migrants and refugees*, Research report for Multicultural Affairs Queensland.
- 2022, *Deloitte Access Economics Employment Forecasts: skill shortages bite – migration to the rescue?*, <https://www2.deloitte.com/au/en/pages/media-releases/articles/deloitte-access-economics-employment-forecasts-skill-shortages-bite-migration-to-rescue-210822.html> (accessed 22 August 2022).
- DCS (Department of Customer Service) 2022, *Regulatory Impact Statement: Building Bill 2022*.
- DeBoos, A. 2022, 'Enterprise bargaining's slow death will give rise to tailored pay deals', *Australian Financial Review*, 27 June.
- DELWP (Department of Environment, Land, Water and Planning) 2017, *Regulatory impact statement Building Regulations 2017: Building practitioner registration*, May.
- 2018, *Regulatory Impact Statement: Plumbing Regulations 2018*.
- Department of Health 2021, *Nurse Practitioner 10 Year Plan: Consultation Paper*.
- Department of Home Affairs 2020, *Continuous Survey of Australia's Migrants: Cohort 5 Report - Introductory survey 2018*.
- 2021, *Streamlining the Business Innovation and Investment Program (BIIP)*.
- 2022, *Migration Program planning levels: 2022-23 Migration Program*, <https://immi.homeaffairs.gov.au/what-we-do/migration-program-planning-levels> (accessed 3 January 2023).
- Department of Labor 2022, 'Employee or Independent Contractor Classification Under the Fair Labor Standards Act', *Federal Register*, vol. 87, no. 197, pp. 62218–62275.
- Deschamps, T. 2022, 'Uber, union reach settlement in Ontario unionization case: UFCW Canada', *The Toronto Star*, 6 May.
- Deutscher, N. 2019, *Job-to-job transitions and the wages of Australian workers*, Treasury Working Paper, 6 January.
- DEWR (Department of Employment and Workplace Relations) 2022, *Trends in Federal Enterprise Bargaining – September quarter 2022*, Text, 23 December.
- DFSI (Department of Finance, Services and Innovation) 2018, *Better Business Reforms explained*, October.
- DHAC (Department of Health and Aged Care) 2023, *COVID-19 vaccine rollout update: 20 January 2023*.
- DHPW (Department of Housing and Public Works) 2019, *Mechanical Services Regulation: Decision Regulatory Impact Statement*, October, Queensland Government.
- DiDi Australia 2021, *Driver Suspension And Disqualification Policy*, <https://web.didiglobal.com/au/legal/driver-suspension-and-disqualification-policy/> (accessed 19 September 2022).
- 2022, *DiDi Advance Driver Program*, <https://web.didiglobal.com/au/didi-advance/> (accessed 19 September 2022).
- DISR (Department of Industry, Science and Resources) 2019, *Building Confidence Report: Jurisdictional Update*, December.
- DIT (Department for Infrastructure and Transport) 2019, *Accredited Professionals Scheme now operational*, https://www.dit.sa.gov.au/news-media/news/article/2019/become_an_accredited_professional (accessed 22 January 2023).
- DMIRS (Department of Mines, Industry Regulation and Safety) 2019, *Decision Regulatory Impact Statement: Review of the Motor Vehicle Dealers Act 1973 and the Motor Vehicle Repairers Act 2003*, July, Government of Western Australia.
- 2021a, *Changes to motor vehicle repairers regulations 2021*, September.
- 2021b, *Licence Reform program*, Government of Western Australia.
- 2022a, *Consultation - Proposed reforms to the Electricity (Licensing) Regulations 1991*, <https://www.commerce.wa.gov.au/publications/consultation-proposed-reforms-electricity-licensing-regulations-1991> (accessed 21 January 2023).
- 2022b, *Decision Regulatory Impact Statement Registration of Building Engineers in Western Australia*.
- 2022c, *Registration of Builders (and related occupations) Reforms: Consultation Regulatory Impact Statement*, October.
- DoH (Department of Health) 2021, *National Medical Workforce Strategy*, Australian Government Department of Health and Aged Care, <https://www.health.gov.au/resources/publications/national-medical-workforce-strategy-2021-2031?language=en> (accessed 22 January 2023).
- DOHA (Department of Health and Aged Care) 2020, *Taskforce Findings: Nurse Practitioner Reference Group Report*, December, MBS Review – Final taskforce reports, findings and recommendations.
- 2022, *Financial Report on the Australian Aged Care Sector., 2020-21*, Australian Government.
- DoorDash 2022, *DoorDash and Transport Workers Union sign charter of principles to ensure safety and fairness for gig workers in Australia*, DoorDash Newsroom, <https://doordash.news/australia/doordash-and-transport-workers-union-sign-charter-of-principles-to-ensure-safety-and-fairness-for-gig-workers-in-australia/> (accessed 22 September 2022).
- nd, *ICA Australia*, https://help.doordash.com/dashers/s/ica-au?language=en_AU (accessed 10 January 2023).
- Duckett, S. 2019, *A mixed model is best for pharmacist prescribing*, March, Grattan Institute submission to the Pharmacy Board of Australia discussion paper on pharmacist prescribing, Grattan Institute.
- and Breadon, P. 2013, *Access all areas: New solutions for GP shortages in rural Australia*, September, The Grattan Institute.
- Eastman, C., Charlesworth, S. and Hill, E. nd, *FACT SHEET 1: Migrant Workers in Frontline Care*, Markets, migration & the work of care in Australia, UNSW, <https://www.arts.unsw.edu.au/sites/default/files/documents/Migrant%20Workers%20in%20Frontline%20Care.pdf> (accessed 26 September 2022).

- Ellery, N. 2017, *Federal Court quashes enterprise agreement voted up by only three employees*, Corrs Chambers Westgarth.
- Engineers Australia 2021, *Barriers to employment for migrant engineers*, Research Report.
- Ergas, H. and Paolucci, F. 2011, 'Providing and financing aged care in Australia', *Risk management and healthcare policy*, vol. 4, pp. 67–80.
- Ervin, K., Reid, C., Moran, A., Opie, C. and Haines, H. 2019, 'Implementation of an older person's nurse practitioner in rural aged care in Victoria, Australia: a qualitative study', *Human Resources for Health*, vol. 17, no. 1, p. 80.
- ESV (Energy Safe Victoria) 2019, *Electricity Safety (General) Regulations 2019*, August.
- 2020, *Electricity Safety (Registration and Licensing) Regulations 2020*, August.
- Farronato, C., Fradkin, A., Larsen, B. and Brynjolfsson, E. 2020, *Consumer Protection in an Online World: An Analysis of Occupational Licensing*, January, w26601, National Bureau of Economic Research, Cambridge, MA.
- de Flamingh, J. and Ellery, N. 2022, *Enterprise bargaining: resurgence or further decline?*, 27 April, Corrs Chambers Westgarth, <https://www.corrs.com.au/insights/enterprise-bargaining-resurgence-or-further-decline> (accessed 26 January 2023).
- Foged, M., Hasager, L. and Yassenov, V. 2022, 'The role of labor market institutions in the impact of immigration on wages and employment**', *The Scandinavian Journal of Economics*, vol. 124, no. 1, pp. 164–213.
- Freudenstein, D. and Duane, B. 2020, *The Rise of the Gig Economy and its Impact on the Australian Workforce: Green Paper*, Institute of Actuaries of Australia, Sydney.
- FTC (Federal Trade Commission) 2022, *FTC Policy Statement on Enforcement Related to Gig Work*, September, Washington D.C., p. 17.
- FWC (Fair Work Commission) 2014, *Productivity and innovation in enterprise agreement clauses: an overview of literature, data and case studies at the workplace level*, Research report, Melbourne.
- 2015, *Plain language drafting tracking document*, Melbourne.
- 2016, *Report from Plain language modern award pilot*, April, Melbourne.
- 2022, *Plain language re-drafting*, <https://www.fwc.gov.au/hearings-decisions/major-cases/4-yearly-review/plain-language-re-drafting> (accessed 30 June 2022).
- 2023, *Cooperative Workplaces program*, <https://www.fwc.gov.au/issues-we-help/cooperative-workplaces-program> (accessed 27 January 2023).
- FWO (Fair Work Ombudsman) 2019, *FWO discontinues legal action against Foodora*, Media Release, June 21.
- 2021, *Loaded rates added to Hospitality Award*, 29 September.
- 2023, *I think I've underpaid my employee*, <https://www.fairwork.gov.au/workplace-problems/common-workplace-problems/i-think-ive-underpaid-my-employee> (accessed 26 January 2023).
- nd, *Effective dispute resolution best practice guide*.
- Garnero, A., Rycx, F. and Terraz, I. 2018, *Productivity and Wage Effects of Firm-Level Collective Agreements: Evidence from Belgian Linked Panel Data*, IZA Discussion Papers, No. 11568, Institute of Labor Economics (IZA), Bonn.
- Georgiou, J., Love, P.E.D. and Smith, J. 1999, 'A comparison of defects in houses constructed by owners and registered builders in the Australian State of Victoria', *Structural Survey*, vol. 17, no. 3, pp. 160–169.
- , — and Smith, J. 2000, 'A review of builder registration in the state of Victoria, Australia', *Structural Survey*, vol. 18, no. 1, pp. 38–45.
- Gerathy, S. 2016, 'NSW inter-city train fleet to be built overseas', Sydney, *ABC News*, 18 August.
- Gillard, J. 2008, *Fair Work Bill 2008 Second Reading Speech*, Canberra.
- Gittleman, M., Klee, M.A. and Kleiner, M.M. 2018, 'Analyzing the Labor Market Outcomes of Occupational Licensing', Wiley-Blackwell, *Industrial Relations*, vol. 57, no. 1, pp. 57–100.
- GMB 2022, *Tens of thousand of Uber drivers to get pay rise*, Media Release, August 15.
- Government of South Australia 2016, *Attorney-General's Department Annual Report 2015-16*, <https://www.agd.sa.gov.au/documents/annual-reports/2015-16-agd-annual-report.pdf> (accessed 15 January 2023).
- Government of the United Kingdom 2022, *Guidance: High Potential Individual visa: global universities list 2021*, <https://www.gov.uk/government/publications/high-potential-individual-visa-global-universities-list/high-potential-individual-visa-global-universities-list-2021> (accessed 5 October 2022).
- Handaya, J. 2022, *Employee or Independent Contractor? The paramount importance of the written contract in determining the relationship between parties is now firmly established.*, HWL Ebsworth Lawyers.
- Hare, J. and Marin-Guzman, D. 2022, 'First victory in push to make WFH an employment "right"', *Australian Financial Review*.
- Harinath, S., Ipsen, Y. and Parameswaran, R. 2021, *How we're using Rules as Code to translate complex policy into easy to use online services*, <https://blog.codeforaustralia.org/how-were-using-rules-as-code-to-translate-complex-policy-into-easy-to-use-online-services-7be4d3ec71af> (accessed 22 August 2022).
- Harper, I., Anderson, P., McCluskey, S. and O'Bryan, M. 2015, *Competition Policy Review*, March, Australian Government.
- Hireup 2021, *Submission to Senate Select Committee on Job Security*, March, Submission no. 23.
- Home Affairs (Department of Home Affairs) 2021a, *2020 – 21 Migration Program Report: Program year to 30 June 2021*.
- 2021b, *Permanent additions to Australia's resident population: 2020-21*, <https://data.gov.au/dataset/ds-dga-e87976fd-c545-4ec0-ab5b-034080868624/details?q=> (accessed 23 September 2022).
- 2021c, *Temporary Skill Shortage visa*, <https://immi.homeaffairs.gov.au/visas/getting-a-visa/visa-listing/temporary-skill-shortage-482> (accessed 18 May 2022).
- 2021d, *Visas for innovation: Global Talent Employer Sponsored program*, <https://immi.homeaffairs.gov.au/visas/working-in-australia/visas-for-innovation/global-talent-scheme> (accessed 18 May 2022).
- 2021e, *Visas for innovation: Global Talent Visa Program*, <https://immi.homeaffairs.gov.au/visas/working-in-australia/visas-for-innovation/global-talent-independent-program> (accessed 18 May 2022).

- 2022a, *Nominating a position: List of current labour agreements*, <https://immi.homeaffairs.gov.au/visas/employing-and-sponsoring-someone/sponsoring-workers/nominating-a-position/labour-agreements/list-of-current-labour-agreements> (accessed 18 May 2022).
- 2022b, *Temporary resident (skilled) report*, June.
- 2022c, *Temporary visa holders in Australia*.
- Hummel, T. 2023, 'French court orders Uber to pay some \$18 mln to drivers, company to appeal', *Reuters*, 20 January.
- Hutchens, G. 2022, 'High Court ruling: Are you an employee or an independent contractor?', *ABC News*, 11 February.
- Hutchinson, S. 2022, 'NSW offers rail workers \$264m sweetener to end strikes', *Australian Financial Review*, 29 June.
- IPART NSW (Independent Pricing and Regulatory Tribunal of New South Wales) 2014, *Reforming licensing in NSW: Review of licence rationale and design*, September, Regulation Review - Final Report.
- IRV (Industrial Relations Victoria) 2020, *Report of the Inquiry into the Victorian On-Demand Workforce*, Melbourne.
- 2022, *Voluntary Fair Conduct and Accountability Standards for Platforms*, Melbourne.
- Jennings, N., Clifford, S., Fox, A.R., O'Connell, J. and Gardner, G. 2015, 'The impact of nurse practitioner services on cost, quality of care, satisfaction and waiting times in the emergency department: A systematic review', *International Journal of Nursing Studies*, vol. 52, no. 1, pp. 421–435.
- Jingmond, M. and Ågren, R. 2015, 'Unravelling causes of defects in construction', *Construction Innovation*, vol. 15, no. 2, pp. 198–218.
- Johnson, J.E. and Kleiner, M.M. 2020, 'Is Occupational Licensing a Barrier to Interstate Migration?', *American Economic Journal: Economic Policy*, vol. 12, no. 3, pp. 347–373.
- Johnston, N. and Reid, S. 2019, *An Examination of Building Defects in Residential Multiowned Properties*.
- Joint Standing Committee on Migration 2015, *Report of the Inquiry into the Business Innovation and Investment Programme*, Canberra.
- 2019, *Efficacy of current regulation of Australian migration agents*.
- 2021, *Final Report of the Inquiry into Australia's Skilled Migration Program*, Canberra.
- Karp, P. 2022, 'Pay to get paid: NDIS workers raise concerns about gig economy platforms', *The Guardian*, 6 August.
- Kleiner, M.M. and Kudrle, R.T. 2000, 'Does Regulation Affect Economic Outcomes - The Case of Dentistry', *Journal of Law & Economics*, vol. 43, no. 2, pp. 547–582.
- Koumenta, M. and Pagliero, M. 2019, 'Occupational Regulation in the European Union: Coverage and Wage Effects.', *British Journal of Industrial Relations*, vol. 57, no. 4, pp. 818–849.
- , — and Rostam-Afschar, D. 2019, *Effects of regulation on service quality: evidence from six European cases*, Publications Office of the European Union.
- Koustantas, D., Parrott, J. and Reich, M. 2020, *New York City's Gig Driver Pay Standard: Effects on Drivers, Passengers, and the Companies*, December, Center for New York City Affairs.
- KPMG 2020, *Industrial Relations Working Together for Reform*.
- Levingston, I. 2022, 'Uber Raises Prices by About 5% in London to Attract More Drivers', *Bloomberg*, 16 August.
- Longland, A., Burns, P., de Flamingh, J., Watson, G. and Creighton, B. 2022, *Categorising work relationships: Contract rules?*, Corrs Chambers Westgarth.
- Love, P.E.D., Edwards, D.J., Irani, Z. and Walker, D.H.T. 2009, 'Project Pathogens: The Anatomy of Omission Errors in Construction and Resource Engineering Project', *IEEE Transactions on Engineering Management*, vol. 56, no. 3, pp. 425–435.
- Mable 2020, *How are disputes resolved?*, https://mable.com.au/help_centre/how-are-disputes-resolved/ (accessed 5 December 2022).
- Maier, C.B., Barnes, H., Aiken, L.H. and Busse, R. 2016, 'Descriptive, cross-country analysis of the nurse practitioner workforce in six countries: size, growth, physician substitution potential', *BMJ Publishing Group LTD, London, United Kingdom, BMJ Open*, vol. 6, no. 9, p. e011901.
- Marin-Guzman, D. 2021, 'Uber paid "incredible" amount to avoid landmark judgment', *Australian Financial Review*, 10 June.
- 2022, 'FedEx moves to bring in new gig workforce', *Australian Financial Review*, 26 July.
- Martin-Misener, R., Harbman, P., Faith, D., Reid, K., Kilpatrick, K., Carter, N., Bryant-Lukosius, D., Kaasalainen, S., Marshall, D.A., Charbonneau-Smith, R. and DiCenso, A. 2015, 'Cost-effectiveness of nurse practitioners in primary and specialised ambulatory care: systematic review', *BMJ Publishing Group LTD, London, United Kingdom, BMJ Open*, vol. 5, no. 6, p. e007167.
- Mavromaras, K., Knight, G., Isherwood, L., Crettenden, A., Karmel, T., Moskos, M., Smith, L., Walton, H. and Wei, Z. 2017, *The Aged Care Workforce 2016*, March, Department of Health, Canberra.
- McDonald, P., Williams, P., Stewart, A., Mayes, R. and Damian, O. 2019, *Digital Platform Work in Australia Prevalence, Nature and Impact*.
- McGuckin, R. and van Ark, B. 2005, *Productivity and participation: An international comparison*, Research Memorandum GD-78, Groningen Growth and Development Centre.
- McKinney, M. 2020, 'Union wants \$2b train fleet pulled from tracks due to safety concerns', *Newcastle Herald*, 19 November.
- McIlroy, T. and Read, M. 2022, "'Massive backlogs": Visa system is failing Australia', *Australian Financial Review*, 19 August..
- McNaughton, S. 2020, 'Rules As Code Discovery Project and Possibilities for the Future'.
- Melbourne Institute (Melbourne Institute of Applied Economic and Social Research) 2021, *HILDA Data Dictionary - Variable detail*, Melbourne University.
- Menulog nd, *Insurance Program*, Menulog Courier Help Centre, <https://courier-help.menulog.com/hc/en-au/articles/360004356456-Insurance-Program> (accessed 13 December 2022).
- Metcalfe Rail Safety Ltd 2020, *Independent Review of the New Intercity Fleet (NIF) Operating Model Final Report Issue 2: 29th September 2020*, 29 September, Wiltshire, United Kingdom.
- Metz, C. 2022, 'Uber Agrees to Pay N.J. \$100 Million in Dispute Over Drivers' Employment Status', *The New York Times*, 12 September.
- Mills, A., Love, P.E.D. and Williams, P. 2009, 'Defect Costs in Residential Construction', *American Society of Civil Engineers, Journal of Construction Engineering & Management*, vol. 135, no. 1, pp. 12–16.

- MinterEllison 2022, *High Court clarifies test for determining employee or independent contractor*, Technical update - MinterEllison.
- Mitchell, R. 1998, 'Juridification and Labour Law: A Legal Response to the Flexibility Debate in Australia', *International Journal of Comparative Labour Law and Industrial Relations*, vol. 14, no. 2, pp. 113–135.
- Moore, G. 2022, 'Long-COVID "absolutely smashed" the labour market', *Australian Financial Review*, 26 August.
- Morrison, S. 2022, *National Cabinet*, Media Release.
- Murray, K.E., Buul, A., Aden, R., Cavanaugh, A.M., Kidane, L., Hussein, M., Eastman, A. and Checkoway, H. 2019, 'Occupational health risks and intervention strategies for US taxi drivers', *Health Promotion International*, vol. 34, no. 2, pp. 323–332.
- NCIRS (National Centre for Immunisation Research and Surveillance) 2022, *Vaccination from community pharmacy – at a glance*, November.
- NDS (National Disability Services) 2021, *NDS Workforce Census Key Findings: June 2021*, Geelong.
- New York City Taxi and Limousine Commission 2018, *Notice of Promulgation*.
- Nissen, L., Lau, E. and Spinks, J. 2022, *The management of urinary tract infections by community pharmacists: A state-wide trial: Urinary Tract Infection Pharmacy Pilot - Queensland (Outcome Report)*, 24 June, Queensland University of Technology, Brisbane, Qld.
- NMBA (Nursing and Midwifery Board Ahpra) 2020, *Fact sheet: Transition to a new assessment model for internationally qualified nurses and midwives*, <https://www.nursingmidwiferyboard.gov.au/Codes-Guidelines-Statements/FAQ/Transition-to-a-new-assessment-model-for-internationally-qualified-nurses-and-midwives.aspx> (accessed 25 September 2022).
- 2022, *Registrant data – Nursing and Midwifery Board of Australia*, September.
- Norton Rose Fulbright 2021, *California's Proposition 22 is ruled unconstitutional*, <https://www.nortonrosefulbright.com/en-us/knowledge/publications/fb487c48/californias-proposition-22-is-ruled-unconstitutional>, <https://www.nortonrosefulbright.com/en-us/knowledge/publications/fb487c48/californias-proposition-22-is-ruled-unconstitutional> (accessed 23 September 2022).
- NSW Fair Trading 2018, *Easy and Transparent Trading: Empowering Consumers and Small Business*, July.
- 2022, *New licensing requirements for medical gas work*, Web Content, <https://www.fairtrading.nsw.gov.au/about-fair-trading/legislation-and-publications/changes-to-legislation/new-licensing-requirements-for-medical-gas-work> (accessed 21 January 2023).
- 2023, *Working on class 2 buildings*, Web Content, <https://www.fairtrading.nsw.gov.au/trades-and-businesses/construction-and-trade-essentials/working-on-class-2-buildings> (accessed 21 January 2023).
- NSW Government 2022, *Government response - Report No. 1 - Select Committee on the impact of technological and other change on the future of work and workers in New South Wales - The gig economy - First report*, October.
- NSW PC (NSW Productivity Commission) 2021, *Productivity Commission White Paper 2021*, May.
- Nurse Practitioner Reference Group 2019, *Post Consultation Report from the Nurse Practitioner Reference Group*, MBS Review – Final taskforce reports, findings and recommendations.
- NYC Consumer and Worker Protection (New York City Consumer and Worker Protection) 2022, 'A Minimum Pay Rate for App-Based Restaurant Delivery Workers in NYC | November 2022'.
- OECD (Organisation for Economic Co-operation and Development) 2019, *Negotiating Our Way Up: Collective Bargaining in a Changing World of Work*, OECD Publishing, Paris.
- 2021, *OECD Economic Surveys: Australia 2021*, OECD Economic Surveys, OECD Publishing, Paris.
- O'Neil, M. 2021, 'The Australian industrial system in the era of COVID-19', *Journal of Industrial Relations*, vol. 63, no. 3, pp. 422–431.
- O'Sullivan, M. 2022, 'NSW intercity trains to finally start carrying passengers', *Sydney Morning Herald*, 7 December.
- Oswald, D., Scholtenhuis, L. olde, Moore, T. and Smith, S. 2021, 'Construction defects, danger, disruption and disputes: a systemic view of the construction industry post-Grenfell', Routledge, *Construction Management and Economics*, vol. 39, no. 12, pp. 949–952.
- Parrott, J.A. and Reich, M. 2018, *An Earnings Standard for New York City's App-Based Drivers: Economic Analysis and Policy Assessment*.
- Paton-Cole, V.P. and Aibinu, A.A. 2021, 'Construction Defects and Disputes in Low-Rise Residential Buildings', *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, vol. 13, no. 1, p. 05020016.
- PC (Productivity Commission) 2005, *Review of National Competition Policy Reforms*, Report no. 33, Canberra.
- 2008, *Review of Australia's Consumer Policy Framework*, Report no. 45, Canberra.
- 2011a, *Caring for Older Australians*, Report no. 53, Canberra.
- 2011b, *Identifying and Evaluating Regulation Reforms*, Research Report, Canberra.
- 2014a, *Childcare and Early Childhood Learning*, Report no. 73, Canberra.
- 2014b, *Geographic Labour Mobility*, Research Report, Canberra.
- 2014c, *Public Infrastructure*, Report no. 71, Canberra.
- 2015a, *Efficiency in Health*, Commission Research Paper, Canberra.
- 2015b, *Mutual Recognition Schemes*, Research Report, Canberra.
- 2015c, *Workplace Relations Framework*, Report no. 76, Canberra.
- 2016a, *Migrant Intake into Australia*, Inquiry Report No. 77, April, Canberra.
- 2016b, *Migrant Intake into Australia*, Report no. 77, Canberra.
- 2017a, *Productivity and Income - The Australian Story, Shifting the Dial: 5 year Productivity Review, Supporting Paper No. 1*, Report no. 84, Canberra.
- 2017b, *Shifting the Dial: 5 year productivity review*, Report no. 84.
- 2021a, *National Agreement for Skills and Workforce Development Review*, Study Report, 21 January.
- 2021b, *Working from home*, Research Paper, Canberra.

- 2022a, *5-year Productivity Inquiry: The Key to Prosperity*, Interim Report 1, Canberra, July.
- 2022b, *Aged care employment*, Study Report, Canberra.
- 2022c, *Aged Care Employment*, Interim Report.
- 2022d, *Lifting productivity at Australia's container ports: between water, wharf and warehouse*, Draft Report, Canberra, September.
- 2022e, *Lifting productivity at Australia's container ports: between water, wharf and warehouse*, Report no. 99, Canberra.
- 2022f, *Report on Government Services 2022 - Part F, Aged care services*, 25 January.
- Pennington, A. 2020, 'The "Fair Work Act" and the decline of enterprise bargaining in Australia's private sector', *LexisNexis, Australian Journal of Labour Law*, vol. 33, no. 1, pp. 68–86.
- Peri, G. 2012, 'The Effect of Immigration on Productivity: Evidence From U.S. States', *Review of Economics and Statistics*, vol. 94, no. 1, pp. 348–358.
- Petek, N. and Thomas, G.K. 2021, 'The Effect of Nurse Practitioner Scope of Practice on Health Care Utilization and Health: Evidence from Law Changes and Patient Moves', *Federal Trade Commission Working Paper*.
- Pharmacy Board 2022, *Accreditation standards for pharmacist prescribing*, October.
- Pharmacy Board of Australia 2019, *Pharmacist prescribing - Position statement*, <https://www.pharmacyboard.gov.au/News/Professional-Practice-Issues/Pharmacist-Prescribing-Position-Statement.aspx> (accessed 27 January 2023).
- Pizzola, B. and Tabarrok, A. 2017, 'Occupational licensing causes a wage premium: Evidence from a natural experiment in Colorado's funeral services industry', *International Review of Law and Economics*, vol. 50, pp. 50–59.
- Powell, B. and Vorotnikov, E. 2012, 'Real Estate Continuing Education: Rent Seeking or Improvement in Service Quality?', *Eastern Economic Journal*, vol. 38, no. 1, pp. 57–73.
- Power, C. and Selinger, M. 2022, *The primacy of the contract: High Court revises approach to determining independent contracting*, <https://www.holdingredlich.com/the-primacy-of-the-contract-high-court-revises-approach-to-determining-independent-contracting> (accessed 24 January 2023).
- PwC (PricewaterhouseCoopers) 2013, *A best practice approach to designing and reviewing licensing schemes – Guidance material*.
- Queensland Health 2022, *North Queensland Community Pharmacy Scope of Practice Pilot*, October, Queensland Government.
- Rana, P. 2021, 'Uber, Lyft Sweeten Job Perks Amid Driver Shortage, Lofty Fares', *Wall Street Journal*, 2 July.
- Ross, I.J.K. 2020, *President's statement: The Fair Work Commission's Coronavirus (COVID-19) update – Draft Award Flexibility Schedule*, Melbourne, p. 40.
- Roy Morgan 2019, *Ride-sharing app Uber overtakes taxis as preferred private transport service*, 26 August.
- 2020, *Uber dominates but faces growing competition from Ola and DiDi in an expanding rideshare market*, 19 February.
- Royal Commission (Royal Commission into Institutional Responses to Child Sexual Abuse) 2015, *Working With Children Checks Report*.
- RTBU Express 2022, *An explainer for RTBU members: Sydney & NSW Trains Enterprise Bargaining 2021-2 & the New Intercity Fleet*.
- von Rueden, C. and Bambalaite, I. 2020, *Measuring occupational entry regulations: A new OECD approach*, OECD Economics Department Working Papers 1606, 31 March.
- Ryder, B. 2021, 'Uber, DoorDash and similar firms can't defy the laws of capitalism after all', London, *The Economist*, 9 November.
- Safe Work Australia 2021a, *Official Committee Hansard*, Official Committee Hansard, Canberra.
- 2021b, *Workers Compensation Coverage Paper*, November, Canberra.
- SafeWork NSW 2020, *New taskforce to investigate gig economy deaths*, Media Release, 24 November.
- and Transport for NSW 2021, *Joint Taskforce: Food Delivery Rider Safety*, April.
- Schadewaldt, V., McInnes, E., Hiller, J.E. and Gardner, A. 2016, 'Experiences of nurse practitioners and medical practitioners working in collaborative practice models in primary healthcare in Australia – a multiple case study using mixed methods', *BMC Family Practice*, vol. 17, no. 1, p. 99.
- Schneiders, B. and Millar, R. 2015, "'Black jobs": Rampant exploitation of foreign workers in Australia revealed', *Sydney Morning Herald*, 1 October.
- SDA (Shop, Distributive and Allied Employees Association) 2019, *How the SDA won the Broken Hill Allowance*, SDA - SA & NT Branch.
- Seattle City Council 2022, *App-Based Worker Minimum Payment Ordinance*, vol. Ord 126595.
- SEERC (Senate Education and Employment References Committee) 2016, *A National Disgrace: The Exploitation of Temporary Work Visa Holders*, March, Canberra.
- Select Committee on Job Security 2021, *First interim report: on-demand platform work in Australia*, June, Commonwealth of Australia, Canberra.
- Select Committee on the Impact of Technological and Other Change on the Future of Work and Workers in New South Wales 2022, *Impact of technological and other change on the future of work and workers in New South Wales: first report the gig economy*, Report 1.
- Senate Economics References Committee 2018, *Non-conforming building products: the need for a coherent and robust regulatory regime*, December, Interim Report, Parliament of Australia.
- Senate Red Tape Committee 2018, *Effect of red tape on occupational licensing*, August, Interim Report, Parliament of Australia.
- Service NSW 2023, *Verify.licence*, <https://verify.licence.nsw.gov.au/home> (accessed 26 January 2023).
- Shergold, P. and Weir, B. 2018, *Building Confidence: Improving the effectiveness of compliance and enforcement systems for the building and construction industry across Australia*, February.
- SIRA (State Insurance Regulatory Authority) 2021a, *Consultation on personal injury insurance arrangements for food delivery riders*, April, New South Wales.
- 2021b, *Provisional liability*, Web content, <https://www.sira.nsw.gov.au/workers-compensation-claims-guide/understanding-the-claims-journey/claims-decisions/provisional-liability> (accessed 18 December 2022).

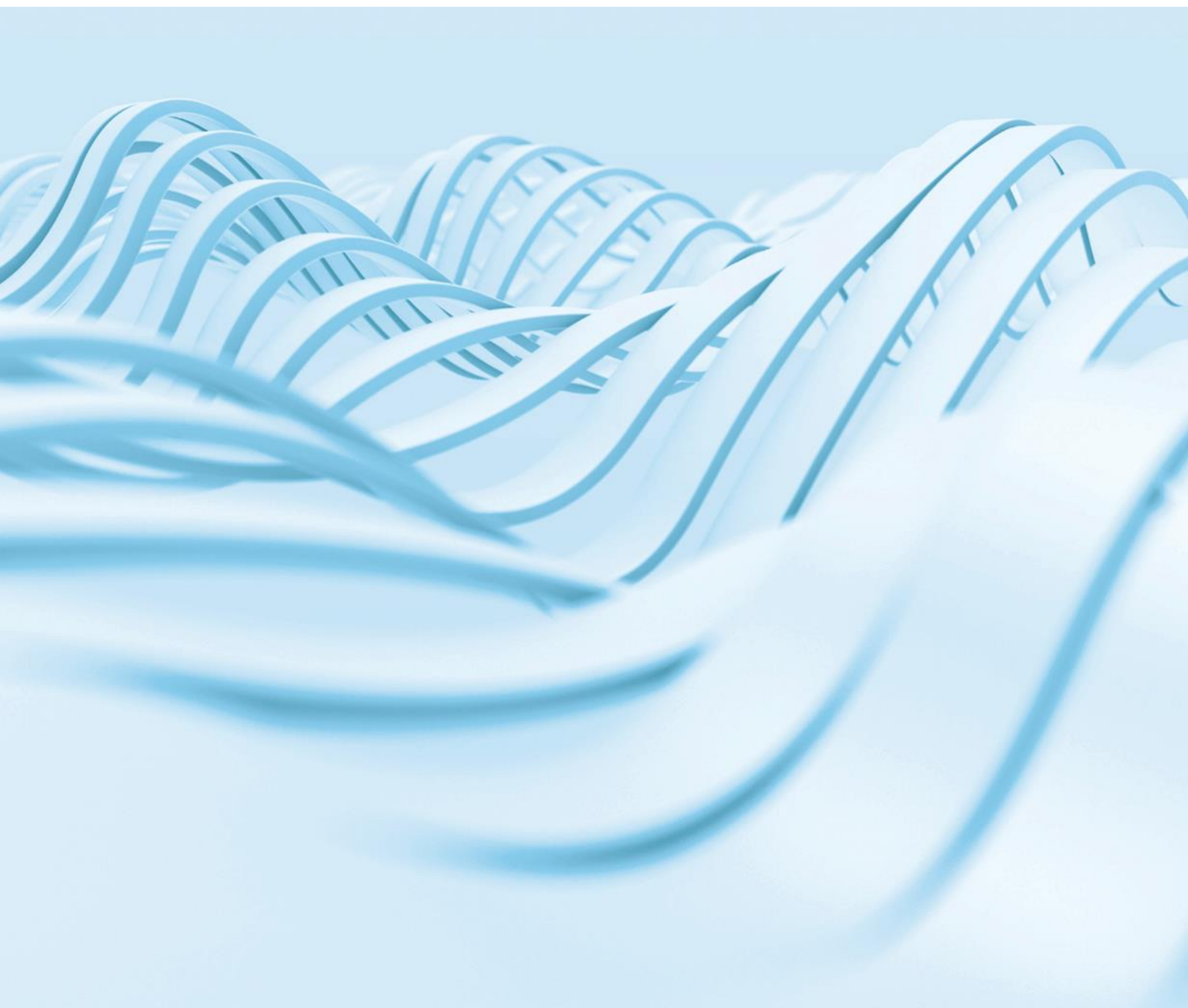
- 2022a, *Medical, hospital and rehabilitation expenses*, Web content, <https://www.sira.nsw.gov.au/claiming-compensation/workers-compensation-claims/medical-hospital-and-rehabilitation-expenses> (accessed 8 December 2022).
- 2022b, *Payments in the event of death*, Web content, <https://www.sira.nsw.gov.au/claiming-compensation/workers-compensation-claims/payments-in-the-event-of-death> (accessed 9 January 2023).
- 2022c, *Return to work programs*, Web content, <https://www.sira.nsw.gov.au/theres-been-an-injury/im-an-employer-helping-my-worker-recover/return-to-work-programs> (accessed 11 January 2023).
- Smith, L.B. 2022, 'The effect of nurse practitioner scope of practice laws on primary care delivery', *Health Economics*, vol. 31, no. 1, pp. 21–41.
- Smith, T., McNeil, K., Mitchell, R., Boyle, B. and Ries, N. 2019, 'A study of macro-, meso- and micro-barriers and enablers affecting extended scopes of practice: the case of rural nurse practitioners in Australia', *BMC Nursing*, vol. 18, no. 1, p. 14.
- Snowball, K. 2014, *Independent Review of the National Registration and Accreditation Scheme for health professions*, December, Australian Health Ministers' Advisory Council.
- Stanford, J., Macdonald, F. and Raynes, L. 2022, *Collective Bargaining and Wage Growth in Australia*, 15 November, The Centre for Future Work.
- Stanik-Hutt, J., Newhouse, R.P., White, K.M., Johantgen, M., Bass, E.B., Zangaro, G., Wilson, R., Fountain, L., Steinwachs, D.M., Heindel, L. and Weiner, J.P. 2013, 'The Quality and Effectiveness of Care Provided by Nurse Practitioners', *The Journal for Nurse Practitioners*, vol. 9, no. 8, pp. 492–500.e13.
- Stewart, A. 2021, *Stewart's Guide to Employment Law*, 6th edn, The Federation Press, Sydney.
- Stewart, A., Forsyth, A., Irving, M. and McCrystal, S. 2016, *Creighton and Stewart's Labour Law*, 6th edn, The Federation Press, Sydney.
- Stewart, A., Stanford, J. and Hardy, T. 2022, *The Wages Crisis: Revisited*, The Australia Institute and the Centre for Future Work.
- Stewart-Crompton, R., Mayman, S. and Sherriff, B. 2008, *National Review into Model Occupational Health and Safety Laws First Report to the Workplace Relations Ministers' Council*, 31 October.
- Supreme Court of Canada 2020, *Uber Technologies Inc. v. Heller*, 26 June 2020 SCC 16, Canada.
- Supreme Court of New South Wales 2022, *Terry Williamson v Sydney Olympic Park Authority trading as Sydney Olympic Park 2019/00232749*, 2019/00232749.
- Sutton, N. and Ma, N. 2022, 'Fixing the aged care crisis won't be easy, with just 5% of nursing homes above next year's mandatory staffing targets', *The Conversation*, 8 June.
- Swerissen, H. 2022, 'Overseas recruitment won't solve Australia's aged care worker crisis', *The Conversation*, 25 August.
- Tan, G. and Cebulla, A. 2022, *When what you have is not enough - Acquiring Australian qualifications to overcome non-recognition of overseas skills*, International Organization for Migration (IOM), UN Migration.
- Tani, M. 2020, 'Migration policy and immigrants' labor market performance', *International Migration Review*, vol. 54, no. 1, pp. 35–57.
- TfNSW (Transport for NSW) 2021, *Mariyung fleet receives final safety tick*, Media Release, 30 July, NSW Government, Sydney.
- The World Bank 2013, *Good Practices for Construction Regulation and Enforcement Reform Guidelines for Reformers*, January.
- Thornton, R., Timmons, E. and Kukaev, I. 2021, 'The De-licensing of Occupations in the United States: A Shifting Trend?', CCH Incorporated, *Labor Law Journal*, vol. 72, no. 3, pp. 146–154.
- Toomey, J., Burns, A. and King, C. 2022, "'Not just outrage, but concern": Doctors say allowing chemists to treat patients will put people at risk', *ABC News*, 23 February.
- Townsend, L. 2021, *Fair Work Commission Full Bench gives green light to 'helpful' pay reconciliation clauses in enterprise agreements*, 13 July, Thomson Geer Lawyers.
- TPWC (Transport and Public Works Committee) 2018, *Plumbing and Drainage Bill 2018*, Report No. 3, Queensland Parliament.
- Treasury & Home Affairs (The Australian Government the Treasury and the Department of Home Affairs) 2018, *Shaping a Nation*, <https://research.treasury.gov.au/external-paper/shaping-a-nation> (accessed 26 September 2022).
- TWU (Transport Workers' Union) 2021, *Submission to Senate Select Committee on Job Security*, April, Submission No. 39.
- 2022, *TWU Wins Enforceable Rates for Couriers & Amazon Flex Drivers in Landmark Decision*, Media Release, 18 February.
- Uber 2020, *Driver deactivation review panel*, Uber Blog, <https://www.uber.com/blog/new-york-appeals/> (accessed 5 December 2022).
- 2022a, *Frequently Asked Questions - Worker Protections*, Uber Blog, <https://www.uber.com/en-GB/blog/driver-worker-faq/> (accessed 13 December 2022).
- 2022b, *Response to Senator Markey*, https://www.markey.senate.gov/imo/media/doc/app-based_delivery_companies_responses_to_senator_markey.pdf (accessed 10 January 2023).
- 2022c, *Support for driver and delivery people*, Uber, <https://www.uber.com/au/en/drive/insurance/injury-protection/> (accessed 13 December 2022).
- 2022d, *Understanding why driver partners and delivery people lose account access*, <https://www.uber.com/au/en/drive/safety/deactivations/> (accessed 19 September 2022).
- 2022e, *Washington drivers gain historic new earnings guarantee and benefits*, Uber Blog, <https://www.uber.com/blog/washington-driver-flexibility-law/> (accessed 23 September 2022).
- nd, *Optional Injury Protection for Drivers | Insurance*, Uber, <https://www.uber.com/us/en/drive/insurance/injury-protection/> (accessed 13 December 2022a).
- nd, *Quality improvement courses | Driving & Delivering - Uber Help*, Uber, <https://help.uber.com/driving-and-delivering/article/quality-improvement-courses?nodeId=9deed9cc-6221-43f8-b699-aaf0d0653569> (accessed 9 January 2023b).
- Uber Canada 2022, *Uber Canada and UFCW Canada reach historic national agreement to benefit drivers and delivery people*, Media Release, Jan 27.
- Uber and TWU 2022, *Uber - Transport Workers' Union of Australia Statement of Principles and Future Commitments for Workers in the On-Demand Economy*, 28 June.

- UNECE (United Nations Economic Commission for Europe) 2022, *Handbook on Forms of Employment*, Geneva.
- Unions NSW 2017, *Air Tasker Busting the Airtasker Myth*, <https://www.unionsnsw.org.au/win/air-tasker-2/> (accessed 17 August 2022).
- Universities Australia 2022, *A migration system to build Australia's future*, <https://www.universitiesaustralia.edu.au/media-item/a-migration-system-to-build-australias-future/> (accessed 4 January 2023).
- Varela, P., Husek, N., Williams, T., Maher, R. and Kennedy, D. 2021, *The lifetime fiscal impact of the Australian permanent migration program*, Treasury Working Paper, Australian Treasury.
- VETASSESS 2023, *SKills Assessment for Migration*, <https://www.vetassess.com.au/skills-assessment-for-migration/professional-occupations/application-process> (accessed 11 January 2023).
- Vette, K., Dalton, L., Dey, A., Hendry, A., Hull, B., Macartney, K. and Beard, F. 2020, *Review of pharmacist vaccination reporting to the Australian Immunisation Register*, May, Final report – Parts A and B, National Centre for Immunisation Research and Surveillance.
- Victorian Government 2019, *Plumbing Regulations 2018*.
- 2021, *Framework For Reform: Modernising Victoria's Building System*.
- 2023, *How to sign up for the Sick Pay Guarantee | Victorian Government*, <http://www.vic.gov.au/how-sign-sick-pay-guarantee> (accessed 25 January 2023).
- Waddington, M. 2020, 'Rules as Code', *Law in Context. A Socio-legal Journal*, vol. 37, no. 1, pp. 179–186.
- Washington State Department of Labor & Industries 2020, *Calculating Premium Rates*, Washington State Department of Labor & Industries, <https://lni.wa.gov/insurance/rates-risk-classes/rates-for-workers-compensation/calculating-premium-rates> (accessed 11 January 2023).
- Washington State Legislature 2022, *HB 2076*.
- Weeks, G., George, J., Maclure, K. and Stewart, D. 2016, 'Non-medical prescribing versus medical prescribing for acute and chronic disease management in primary and secondary care', *The Cochrane Database of Systematic Reviews*, vol. 11, no. 11, p. CD011227.
- Wilcox, I. 2022, *Australian Industry Group (Ai Group) submission to the inquiry: A Migration System for Australia's Future*, The Australian Industry Group.
- Wing, A. 2021, *Report on proceedings before the Select Committee on the Impact of Technological and Other Change on the Future of Work and Workers in New South Wales*, 18 October, Sydney.
- Wolters Kluwer Australia 2022, *NSW: Minimum pay for Amazon gig economy drivers*, 21 February.
- Xue, Y., Ye, Z., Brewer, C. and Spetz, J. 2016, 'Impact of state nurse practitioner scope-of-practice regulation on health care delivery: Systematic review', *Nursing Outlook*, vol. 64, no. 1, pp. 71–85.
- Zapletal, M. 2019, 'The Effects of Occupational Licensing: Evidence from Business-Level Data', Wiley-Blackwell, *British Journal of Industrial Relations*, vol. 57, no. 4, pp. 894–918.
- Ziffer, D. and Janda, M. 2022, 'Deliveroo abandons Australia, leaving riders, restaurants and diners in the lurch', *ABC News*, 16 November.



5-year Productivity Inquiry: From learning to growth

Inquiry report – *volume 8*



The Productivity Commission acknowledges the Traditional Owners of Country throughout Australia and their continuing connection to land, waters and community. We pay our respects to their Cultures, Country and Elders past and present.

The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Further information on the Productivity Commission can be obtained from the Commission's website (www.pc.gov.au).

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ISSN 1447-1337 (online)

ISSN 1447-1329 (print)

ISBN 978-1-74037-759-1 (set)

ISBN 978-1-74037-767-6 (volume 8)

An appropriate reference for this publication is:

Productivity Commission 2023, *5-year Productivity Inquiry: From learning to growth*, Vol. 8, Inquiry Report no. 100, Canberra

Publication enquiries:

Media, Publications and Web | phone 03 9653 2244 | email publications@pc.gov.au

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The Commission’s report is divided into 9 volumes: an overview document (volume 1) that presents our policy agenda, and inquiry content volumes (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda, including a modelling appendix. The full report is available from www.pc.gov.au.

Preface

Australia thinks of itself as a country rich in mineral resources. But, arguably, Australia's most valuable resource is its 26 million brains. With them we understand and use technology (from here and overseas), develop ideas and technology of our own, perform skilled work, manage our teams better, and improve our service delivery. The resources to thrive in the coming decades will necessarily come from our ideas, and from making the best use possible of them in our economy.

This is a challenge at a time when technology is transforming the nature of work. There has been a strong decline in the share of routine jobs over the past thirty years, particularly manual routine jobs, and an increase in non-routine cognitive work.

The reduction of routine tasks means that most workers will need a basic skill level to adapt to jobs that have complex demands. And it will be increasingly valuable to develop high-level skills, both for the economy and the individuals concerned. A large share of new jobs created in the next five years will require tertiary qualifications, and of these the majority will require university qualifications; the trend is likely to continue. White-collar work will not be immune from the changes brought about by digital technologies and artificial intelligence. Most people will need to learn new skills in an ongoing way to avoid obsolescence, and to find a new occupation if necessary.

Developing **foundational skills at school** is vital in this context. Young people who graduate from school without foundational skills will find it increasingly difficult to find secure work. One fifth of Australians have insufficient basic literacy and numeracy, and risk being marginalised and excluded from job markets. Foundational skills are also essential for continuing successfully to tertiary education, and for being able to learn new skills later in life. Yet increases in funding for schools in the past decade have not corresponded with improved results. If anything, a larger share of students is falling behind, particularly in numeracy. The implications for inequality are profound.

There are several promising tools for improving outcomes in schools. Giving teachers access to high-quality teaching materials reduces the variation between schools and frees up teachers to focus on better teaching. So does developing a systematic body of research on what works in the classroom and ensuring its adoption. Reducing the administrative burden on teachers provides more time for student support and improves retention of teachers. Digital technologies may support students falling behind or taking a subject outside of the scope of training of teachers in their school. Innovative new models (in terms of hours, governance or modes of delivery) may help reach disengaged students or provide new routes to excellence.

For **vocational education and training (VET)**, and for **universities and other higher education providers**, the rise of non-routine work and the explosion of high-skill jobs has implications for the **quantity** and **quality** of education needed. The Productivity Commission is advocating a cautious and gradual expansion of income-contingent loans to all career-oriented VET courses, starting at the Diploma level, so that more students can continue their studies after high school. The Commission also advocates for a return to a demand-driven university system, to meet growing demand and eliminate the distortions caused by funding caps for universities. Accompanied by recommended changes in the funding model to limit the fiscal cost of such a transition. Giving more students access to higher education is beneficial for them and the economy.

However, there are limits to the effectiveness of a quantity-driven strategy. Improvements in the quality of critical thinking and the relevance of the technical skills taught are sorely needed. Without these, skill shortages will persist, and firms will lack the new ideas and technical knowledge to deliver productivity improvements.

Satisfaction with VET and university has been mixed among graduates and employers. Course content in VET is slow to adapt. Incentives for universities to improve their teaching are weak. More needs to be done to promote quality teaching and leverage the opportunity presented by the ongoing shift online, which has been accelerated by the COVID-19 pandemic.

Most countries struggle with the challenge of improving the quality of tertiary education teaching. Students choose based on reputation and considerations such as location, with little information on teaching quality. Properly assessing and rewarding lecture delivery and quality materials is costly and can be gamed. But what information is out there can be leveraged more effectively: university lectures could be made freely accessible, survey data on VET and higher education could be expanded and made more salient to students choosing courses, and regulators' assessments of quality could be deepened. More study of what works and more rewards for what works are also useful.

Beyond entry-level qualifications, Australia has much to gain from **lifelong learning**. Keeping skills current, adapting to changing roles and changing occupations will all be vital to Australia's future productivity. In addition to making university lectures available to all, the government should build a consolidated strategy to ensure that all Australians can access learning through-out their lives and grow with the economy.

Let's use our most precious resource well.

1. The value of human capital

Key points

- * **Education increases people's capabilities — allowing them to do more or better work in the same time. It also makes society healthier, safer, better informed, and more civically engaged, as well as fostering social mobility.**
- * **Skills developed through education, training and on-the-job experience underlie the capacity to make the fullest use of technology, generate new ideas, and apply knowledge from within Australia and from overseas.**
 - Rising skill levels have contributed to Australia's productivity growth in recent decades, although it is challenging to measure the share of growth that can be attributed directly to education.
 - One in five Australians have low basic skills, which limits their job opportunities, versatility, capacity to acquire further skills, and lifetime wages. Quality education can help prevent young Australians from ending up with low basic skills, and improve social inclusion.
- * **As our reliance on the services sector expands, people's capabilities ('human capital') will play a more important role than physical capital in improving productivity.**
 - **General and foundational skills** will continue to underpin the workforce's contribution to productivity, and as routine tasks are automated, newly created jobs will increasingly rely on areas such as interpersonal skills, critical thinking, working with more complex equipment, and accomplished literacy and numeracy.
 - **Specific skills** in areas such as data and digital technology, allied health care and community services will be increasingly needed due to the changing composition of the economy and an ageing population.
- * **Beyond these trends, we cannot predict many of the jobs that will emerge over the coming decades. An adaptable system developing general capabilities as a complement to technical skills can provide resilience to these changes.**
- * **Outcomes across schooling, VET, and higher education are reasonable but there is still room to improve. Raising student outcomes for a given number of years of education and better matching what is taught to emerging skill needs will be critical to Australia's ongoing prosperity.**

1.1 Education is vital for productivity

Education is vital in developing ‘human capital’, which describes the economic and social value of a person’s skills and experience. Investments in human capital can increase an individual’s earnings, health, capacity to participate in the broader community, and their ability to appreciate art and culture. Education is a primary pillar in human capital development and can improve all these outcomes. Reflecting its importance, in 2020-21 government expenditure on education totalled \$116 billion (ABS 2022c). This volume of the inquiry focuses specifically on how education enables workforce productivity.

Many inquiry participants highlighted the importance of education for productivity, including those within the sector and those with a broader interest in productivity.¹ Many of these submissions remark on the role of education in developing human capital and how this drives productivity growth as well as its broader value, ‘providing the basis for successful engagement with the labour market and contributing to wellbeing’ and ‘contribut[ing] to civic values and creat[ing] the conditions for a more informed, engaged and productive citizenry’ (Tasmanian Government, sub. 196, p. 12; DASSH, sub. 141, p. 1).

The Productivity Commission has considered parts of the education sector in recent years (PC 2017a, 2019, 2020c). This inquiry is an opportunity to examine its role in promoting productivity, as well as lessons and opportunities from the COVID-19 pandemic. While this volume is primarily focused on the formal education system, this is only one channel that contributes to skill formation and labour productivity. For example, on-the-job training and experience also play a key role in developing human capital.

Improved education can contribute to productivity across the whole economy. But it is even more important for future productivity growth in the services sector, where human capital plays a much greater role. In agriculture and traditional manufacturing, physical capital accumulation and increasing mechanisation allows far fewer workers to produce far more. This might not be replicated in many parts of the services sector. For example, increased productivity in residential aged care is likely to reflect *better* care by staff. There may be less scope for reductions in staff-to-resident ratios facilitated by new technologies.

Education will also be critical for reaping the economy-wide benefits of automation and digital technologies — future growth is likely to involve a greater level of skill-biased technological change. These factors have prompted a growing need for tertiary graduates in the labour force. At the same time, school student test scores have been stagnant or declining, and new modes of education delivery have emerged. Although these challenges are not new, the COVID-19 pandemic has been an accelerant. Securing the right system settings now is imperative to ensure that Australia does not miss the opportunities of a world economy changing at an increasingly rapid rate.

Rising skill levels have underpinned Australia’s productivity growth

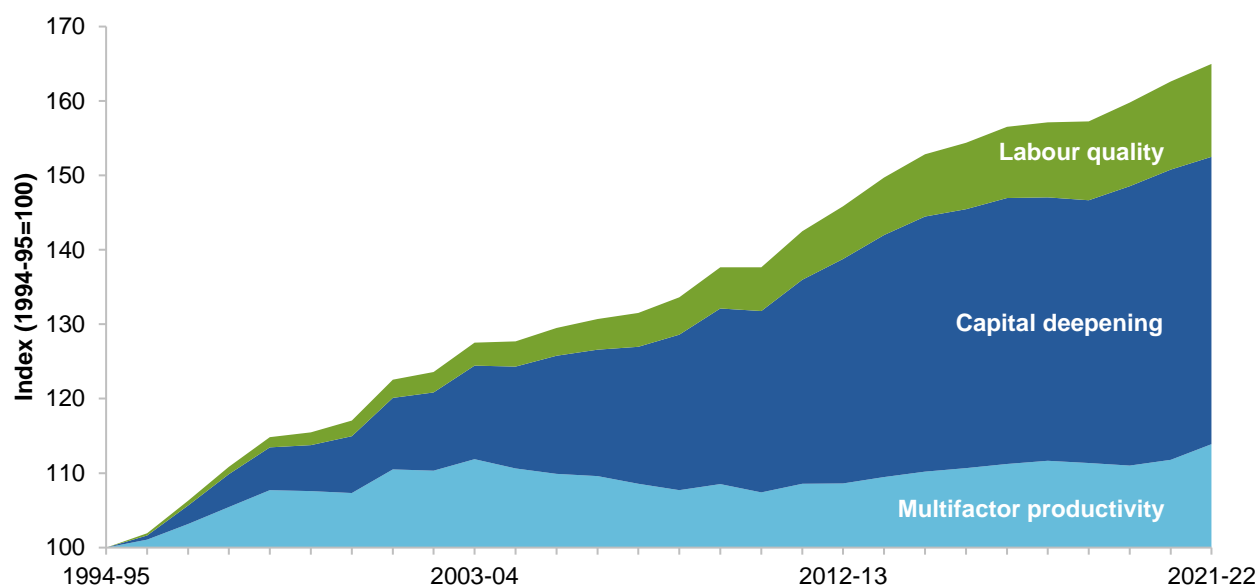
The evidence that education plays an important role in productivity growth is compelling. From 1993 to 2021, the share of Australian adults with less than a high school education fell from 47% to 16%, while the share of adults holding tertiary qualifications rose from 22% to 50% (OECD 2023). As this happened, the measured

¹ See for example, gemaker, sub. 13, Jenny Gordon, sub. 17, Australian Education Union Federal Office, sub. 21, The Smith Family, sub. 26, National Tertiary Education Union, sub. 36, Grattan Institute, sub. 37, Australian Chamber of Commerce and Industry, sub. 47, Australian HR Institute, sub. 54, Primary Focus, sub. 56, KPMG, sub. 60, Universities Australia, sub. 70, Alphacrucis University College, sub. 133, DASSH, sub. 141, Desmond Griffin, sub. 143, Regional Universities Network, sub. 154, Australian Chamber of Commerce and Industry, sub. 175, Innovative Research Universities, sub. 177, Ai Group, sub. 179, La Trobe University, sub. 182, Monash University, sub. 184, Group of 8, sub. 187, Science & Technology Australia, sub. 188, Universities Australia, sub.195, Tasmanian Government, sub. 196.

quality of labour in the economy improved. Figure 1.1 shows the results of a standard ‘growth accounting’ exercise. Relying on some assumptions, one can measure how more education (labour quality), more machinery and equipment (capital deepening), and more innovation (multifactor productivity) contribute to the growth in labour productivity. Labour quality — reflecting the education and experience of the workforce — has accounted for about 20% of labour productivity growth in recent decades. This suggests that labour quality has accounted for a larger share of labour productivity growth as other drivers have started to slow or stall.

This result is only approximate, as it relies on a number of assumptions. In particular, it relies on correctly measuring the growth in labour quality. Labour quality is measured in terms of the average years of education in the workforce, with an adjustment for average years of work experience. If greater numbers of educated workers reduce the benefits of additional education, then growth accounting would overestimate the contribution of labour quality. Likewise the contribution could be overstated if the quality of education had fallen. At the same time, better education could also be contributing to other factors, by increasing capital investment, innovation, or allowing workers to better use capital; in that sense growth accounting could underestimate the contribution of education (Cole, Paulson and Shastry 2014; Kong, Zhang and Zhang 2022; Parker and van Praag 2006; Riddell and Song 2017). That said, multifactor productivity has stagnated in recent decades despite the growth in educational attainment.

Figure 1.1 – Labour productivity has grown partly due to a more skilled workforce^a
Factors accounting for labour productivity growth since 1994-95



a. Capital deepening reflects the increase in GDP per hour worked that can be explained by higher levels of capital. Labour quality reflects the increase in GDP per hour worked that can be explained by higher levels of workforce education and experience and is not the causal effect of education. Multifactor productivity is the change in GDP per hour worked that cannot be explained by these factors.

Source: ABS (*Estimates of Industry Multifactor Productivity*, 2021-22 financial year, Cat. no. 5260.0.55.002, table 2).

It has been noted there may be limits in the contribution of increasing levels of education to economic growth (Tom Karmel, sub. 197, p. 1), as rising education levels reduce the productivity uplift from an even greater number of skilled workers. However, there is no evidence that we have reached — or are even close to — the point where the cost of education for marginal workers outweighs the benefit received by them and by society (chapter 3). And most new jobs are forecast to require some level of tertiary education (section 1.2).

Although aggregate productivity statistics point to an important role for education, the magnitude of the causal relationship is difficult to determine from the macroeconomic picture alone. The microeconomic evidence outlined below provides a stronger indication.

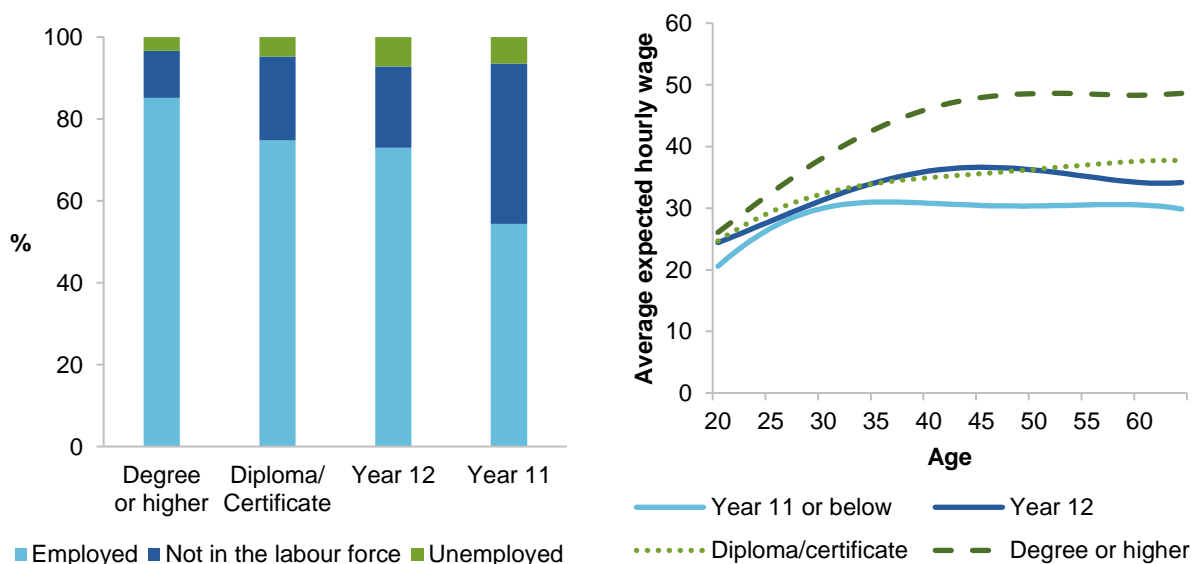
Education improves worker productivity

More educated workers are more likely to be employed and earn higher wages, even after accounting for some individual characteristics (figure 1.2).²

These effects remain strong despite two well-known confounders in the relationship between education and earnings.

- People with more innate ability take part in more education, meaning some of the effects of education will reflect pre-existing ability rather than the effect of education itself. Nonetheless, Australian evidence still finds substantial earnings and labour force participation benefits to the completion of secondary school, vocational education, and higher education after accounting for unobserved innate ability (Leigh 2008).³
- The ‘signalling’ theory holds that education could provide little benefit to worker productivity, but nevertheless increase earnings by showing employers the worker has the ability to complete their qualification. However, empirical evidence suggests that strong earnings benefits remain beyond the impact of signalling (box 1.1).

Figure 1.2 – More educated workers are more likely to be in the labour force and earn more over their lifetime



Source: Productivity Commission estimates using wave 20 of the *Household, Income and Labour Dynamics in Australia* survey, following Forbes, Barker and Turner (2010).

² Variables accounted for include gender, age, geographic location, and employment variables.

³ The method used to account for this ‘ability bias’ credibly found that this inflates the apparent earnings benefits of education by about 10% for secondary school students. However, it simply assumed that this bias is of the same magnitude in vocational and higher education.

Box 1.1 – Human capital and signalling theory – does a qualification make you smarter or just signal that you might be smarter?

Economists have long debated why workers with greater levels of education earn a higher income. **Human capital theory** holds that education — from schooling to university — increases a worker's productive capacity, which is rewarded by higher pay (Becker 1962). **Signalling theory**, however, holds that education has little or no intrinsic benefit, and that educated workers are only paid more because their higher innate ability makes it easier for them to complete qualifications, which they use to signal to employers that they are innately smart or hard-working (Spence 1973). Ultimately, there is evidence to support both human capital and signalling benefits of education, and recent work centres on measuring the extent of each effect (Huntington-Klein 2021).

But there is evidence against the most extreme form of signalling theory in that the earnings benefits from greater levels of education for workers with the same initial ability persist over time — if education is only valuable as a signal of ability, why would the effects persist even after employers can directly observe the ability of employees? There are two possible explanations. First, that employers are unable to ascertain the ability of their employees. And second, that starting out in a high-paid position locks workers onto a permanently higher-paying career trajectory.

Recent research has challenged these explanations and therefore signalling theory, comparing graduates who were just above or just below the threshold for university awards or had their marks arbitrarily rounded higher or lower — with the same ability, but different signals of their ability. In two studies, earnings for those with this false signal were higher initially, but differences disappeared after two years (Khoo and Ost 2018; Toft Hansen, Hvidman and Sievertsen 2021). The employers saw through the misleading signals, instead paying workers based on their ability. And starting out in a higher-paid position did not seem to have lasting effects.

Given this, persistent earnings benefits over time among workers with the same initial ability imply genuine human capital development from education. In fact, earnings benefits seem to grow over time (Bhuller, Mogstad and Salvanes 2017). These findings are significant, implying that tertiary education increases total workforce productivity by developing human capital, rather than merely redistributing the same jobs from less to more educated individuals through signalling effects.

Education develops general labour force skills ...

Education is critical to general skills development. There is evidence of benefits from both secondary and tertiary education to general cognitive performance (Kamhöfer, Schmitz and Westphal 2019; Ritchie and Tucker-Drob 2018). Literacy and numeracy skills, although largely developed at school, also increase at a faster rate among university students compared with other people of the same age (Hampf 2020).⁴

It also improves other non-cognitive skills, with evidence that this occurs into the post-schooling years. For example, an Australian study found that non-cognitive skills — such as sociability and tendency to co-operate — improve at a faster rate among those who go to university compared with those who do not

⁴ While this study estimated notable increases in both literacy and numeracy skills, the timing of tests means that some of these skills may have been gained while in the workforce, rather than at university.

(Kassenboehmer, Leung and Schurer 2018). And people who finish high school are often better equipped to make informed decisions, a skill that leads to a range of other benefits (OECD 2010).

Educated workers undertake more formal and informal on-the-job training (OECD 2012) which has similar benefits for productivity (Dostie 2010).⁵ Overall, the OECD estimated that increasing the skills of workers in median-productivity firms up to the skills of workers in firms on the productivity frontier could close the productivity gap between these firms by 19% (Criscuolo et al. 2021).

Beyond developing skills, education can also enable workers' skills to be put to better use. There is evidence that higher education can improve the matching of workers to jobs, as indicated by how long graduates stay with their first employer (Floyd, Tomar and Lee 2022), an additional channel through which education can increase productivity.

... fosters greater levels of innovation ...

An educated workforce has the potential to facilitate innovation. Clearly, advanced education in areas such as science, digital technology or medicine is a key input to technological breakthroughs in many areas. Similarly, increases in the supply of educated workers lead to greater levels of innovative activity from firms (Kong, Zhang and Zhang 2022). Managers with greater levels of education invest more in research and development (Huang et al. 2020). And education increases the success of entrepreneurs (Parker and van Praag 2006).

However, as emphasised in this inquiry's companion volume *'Innovation for the 98%'*, Australia can also see significant gains from adopting and putting into practice novel, or new-to-world, innovations from overseas, or from broader diffusion of Australian innovations. An educated workforce supports this diffusion, partly because educated workers are more likely to adopt new technologies (Riddell and Song 2017). Given the key role of innovation for productivity growth, this presents yet another mechanism through which education can drive productivity.

... and delivers broader benefits to society

Education improves productivity partly due to the positive spillovers it creates — benefits to society beyond the educated person. For example, workers may pass their skills or insights from their learning on to their peers, co-workers, or children and so increase their productivity (Bentsen, Munch and Schaur 2019; Suhonen and Karhunen 2019) A greater overall level of education may also create new jobs for lower skilled workers (Schultheiss, Pfister and Backes-Gellner 2018).

Further, education could improve health and reduce crime by enabling people to make better-informed life choices (Hai and Heckman 2022; Hjalmarsson, Holmlund and Lindquist 2014; Jha and Polidano 2016; Kamhöfer, Schmitz and Westphal 2019). The higher employment rates and earnings resulting from education can also reduce government support payments and raise tax receipts, which could be used to fund productivity-enhancing reforms or lower the tax burden.

Other work suggests that the benefits from education could be even broader. Higher levels of education appear to be associated with community engagement, advocacy and volunteering, trust and tolerance,

⁵ Although some research found that the benefits to the worker and the firm are roughly equal (Nilsson 2010), other work suggests wage benefits to workers, although positive, are smaller than the increase in their productivity (Konings and Vanormelingen 2015).

healthy behaviours, environmental conservation activities, employment and business management, lower financial stress, and reduced reliance on government support payments (DESE 2019).⁶

Public investment in education has been found to reduce inequality (Fournier and Johansson 2016) and generally ‘improves society by increasing equity and social cohesion’ (Australian Education Union, sub. 21, p. 3), potentially improving the prospects of the most disadvantaged students by fostering social mobility. Intergenerational cycles of disadvantage can also be disrupted by education, with parental education increasing a child’s attainment and reducing the chance that they repeat a grade (Havari and Savegnago 2014; Oreopoulos, Page and Stevens 2006).

University peak bodies have quantified the benefits of education, consolidating many of the factors outlined above, although there are significant limitations to the analysis that suggest it may overstate the net benefits (box 1.2).⁷

Box 1.2 – Reports from university peak bodies are overconfident in their estimated benefits of higher education

Recent studies commissioned by university peak bodies suggest large returns on investments in universities – with each dollar invested in university teaching apparently returning \$4 to society (Deloitte Access Economics 2020, p. 22), and education by Group of Eight universities providing \$5 billion in value to society, not including a potential \$11 billion in additional benefits to employers (London Economics 2018, p. viii).

However, there is reason to believe that the true effects are more limited, and far more challenging to estimate, than these reports suggest.

Both London Economics and Deloitte Access Economics included in their analysis the multiplier effects of university spending (that is, benefits to other businesses). Implicitly, this makes the incorrect assumption that governments and consumers would not spend these funds elsewhere if universities did not exist, or that if they did, there would be no multiplier. Indeed, guidance on cost-benefit analysis typically recommends against the inclusion of multipliers (Infrastructure Australia 2021, p. 89; NSW Treasury 2017, p. 12). London Economics also simply counted overseas student non-tuition spending in Australia as an economic contribution rather than estimating the net contribution (additional consumption minus additional labour supply); the net contribution using this approach is likely to be far smaller (PC 2020b, pp. 151–153). Making these adjustments significantly reduces the estimated effect.

Deloitte Access Economics used OECD country data to estimate a production function representing each country’s economy. The share of workers who have completed tertiary education was included as a multiplicative input. This approach will not perfectly capture the relationship between education and

⁶ While education is linked to a greater probability of these outcomes, it is difficult to disentangle the contribution of education, as those who opt in to additional education may be independently more likely to achieve them. However, international analyses that account for this have found beneficial effects in line with the Australian results for these outcomes (Hai and Heckman 2022; Kämpfen 2021; Österman 2021).

⁷ Note, these studies also attempt to estimate the estimated impact of university research output, however in the context of this volume we focus on their findings regarding the impact of university education. These research impact estimates also have some limitations. For example, diminishing marginal returns to research are not accounted for, and the methodological approach risks attributing the benefits of overseas R&D to Australian universities.

Box 1.2 – Reports from university peak bodies are overconfident in their estimated benefits of higher education

output — at the extreme, it implies that Australia’s GDP would be zero if all workers with tertiary qualifications did not have those qualifications.

Both papers estimated the impact on earnings of a university education. Students who attend university on average have characteristics that make them more likely to succeed in the labour market, even without a university education; so this must be accounted for. While both controlled for cognitive ability, using a rough measure, they did not control for other characteristics associated with university attendance, such as aspects of family background or individual personality; so the impact of university is likely overestimated, as educated workers would have earned more even without their education. London Economics at least acknowledged the estimates they use ‘do not provide any evidence on the causal effects of education attainment’, although they nevertheless used these estimates.

Any attempt to quantify benefits involves methodological challenges. But assumptions in modelling need to be reasonable. And reporting of impacts should imply a degree of certainty that is proportional to the strength of the evidence.

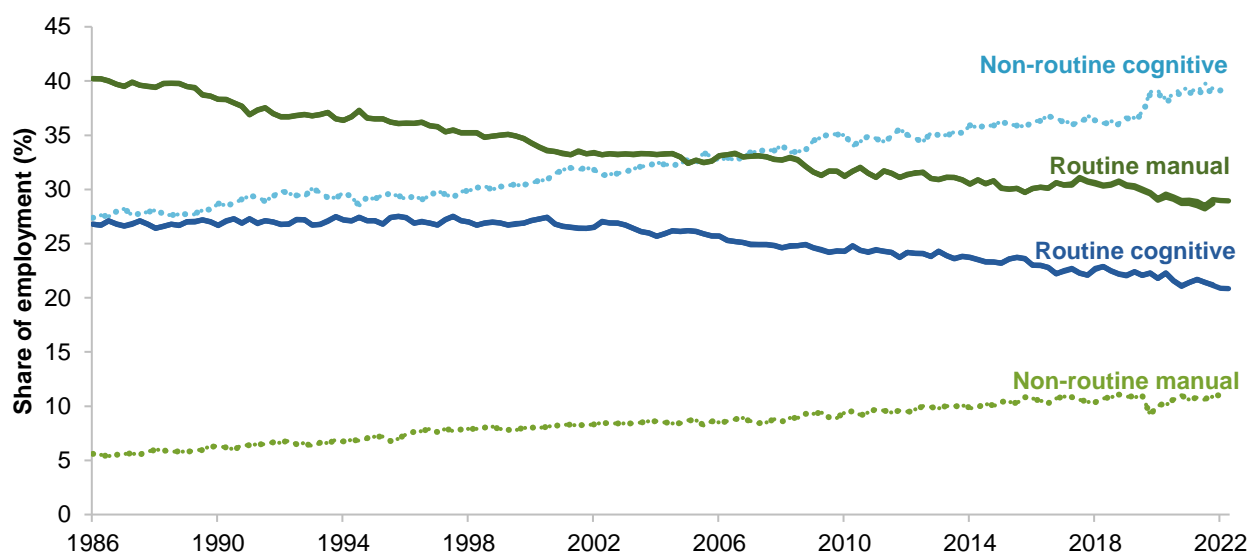
This is not to say that the benefits of education are not large, or that they do not justify further expansion of access to education. However, efforts to quantify these benefits (particularly when paid for by parties with a vested interest) need to be interpreted with caution.

1.2 What skills are necessary for Australia’s future workforce?

The education sector needs to adapt to emerging skills requirements of the Australian economy. The skills demanded have been shifting, and there is also likely to be ongoing structural adjustment in the wake of the COVID-19 pandemic. Over time, technological change and automation have replaced or enhanced aspects of some jobs, and generated demand for others (PC 2017, p. 83). An increasing proportion of jobs require non-routine skills, which typically demand workers with higher levels of education or training (figure 1.3). Past experience suggests automation is likely to shift tasks and occupations to new areas rather than simply eliminate them. As jobs and tasks change more rapidly, it will become increasingly important that education provides adaptable general skills. In particular, this would mean benefits to the workforce go beyond higher earnings to increased job security and lower risk of obsolescence.

In addition the services sector now predominates, accounting for 90% of workers, up from about 50% in 1900 — affecting the skills required in the economy (PC 2021, p. 6). Similarly, population ageing has meant rising demand for health and care workers. Education can develop the skills needed to meet these structural shifts, and reskill workers who become displaced (Ernst, Merola and Samaan 2019).

Figure 1.3 – Non-routine skills are increasingly demanded, particularly cognitive
Job types in the labour force (share of total)^a



a. Based on a mapping from ABS labour force to Australian and New Zealand Standard Classification of Occupations job classifications. Non-routine, cognitive: Managers, Professionals; Non-routine, manual: Community and Personal Service Workers; Routine, cognitive: Clerical and Administrative Workers, Sales Workers; Routine, manual: Technicians and Trades Workers, Machine Operators and Drivers, Labourers.

Source: ABS (*Labour Force, Australia, Detailed*, November 2022, Cat. no. 6291.0.55.001, table 7).

Foundational skills underpin productivity

The quality of the education received early in life affects wellbeing and has a long-term influence on Australia's economic growth and prosperity. Education prepares children for their future lives by providing foundational skills required to participate in further education or training, enter the workforce, and participate wholly in society as adults. It is at primary and secondary school that students acquire the foundations of learning in literacy, numeracy and digital skills recognised as 'essential skills for every student' (Education Council 2020, p. 13).

Conversely, poor literacy, numeracy, and digital skills limit workers' ability to perform many tasks or engage in further training. Put bluntly by one participant in this inquiry:

[P]roductivity enhancing attainment at TAFE and University are bounded by the limits of achievement at earlier levels of schooling. Poor readers make poor students at any stage of education. (Primary Focus sub. 56, p. 4)

Many Australians are still limited by these skills. One in five adults have low basic skills, leaving them unable to perform tasks that could include reading a petrol gauge or understanding the label on painkillers (OECD 2017). This is associated with lower likelihood of being in employment, education or training; and lower incomes. A better education system would reduce the share of lower-skilled people and promote their wellbeing and the productivity of the workforce. And foundational skill deficits will become even more damaging as the demand for routine manual skills continues to decline (figure 1.3).

Non-routine work requires more than technical skills

Interpersonal skills are also critical to many workplaces, with effective and respectful engagement with co-workers, managers, customers, or clients as their foundation. While interpersonal skills will often reflect family characteristics and general social norms, education and training can also play a role. For example, the ethos of customer-centric care in aged and disability care involves some teachable practices. Research has found strong earnings and productivity benefits to non-technical skills, and that these skills can be developed through education at many levels, ranging from preschool to on-the-job training (Heckman and Kautz 2012; Prada, Rucci and Urzúa 2019).

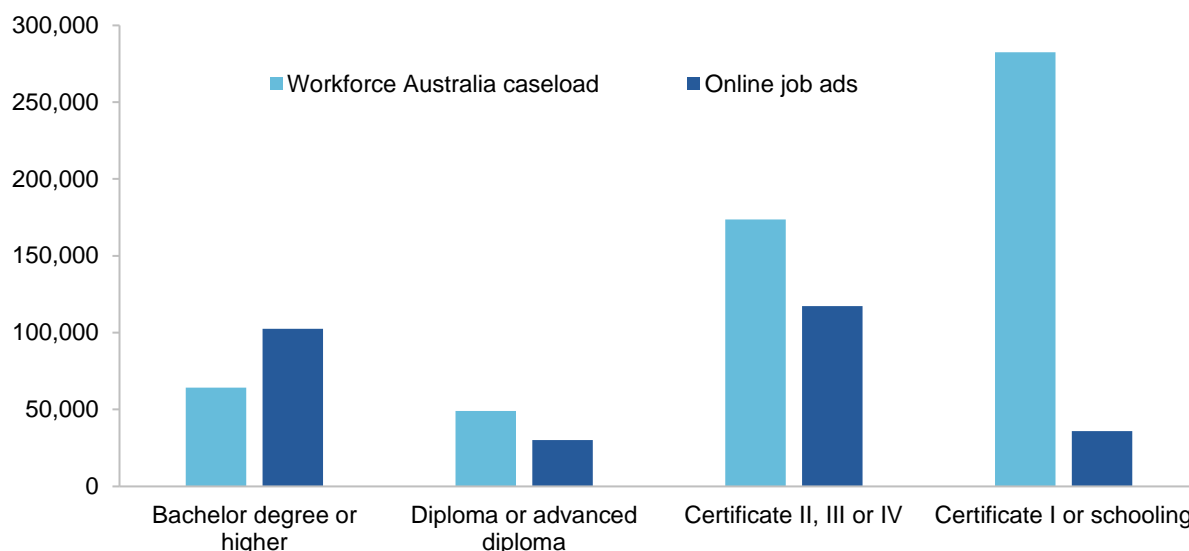
Skill formation will be essential to the future workforce

Skill requirements will grow in future decades. Even now, there is a significant mismatch between the qualification levels demanded by employers and those possessed by job seekers (figure 1.4). And this could worsen, with the former National Skills Commission (NSC) projecting that more than nine out of ten jobs created in the next five years will require post-school education, and that three out of every five new jobs will be high-skilled (NSC 2022b) (figure 1.5).

The NSC identified computing, cognitive abilities, communication, and care as key skills needed for future job growth (NSC 2021, p. 113). Developments in ‘caring’ sectors in particular will drive future skill needs. In 2020-21, for every one retirement age person, there were 3.9 working age people, but by 2060-61, there will only be 2.7. The number of working age people for every person over the age of 85 is expected to fall from 33.2 to 12.5 over the same time period (Centre for Population Projections 2021). This will increase the demand for aged care workers. And growing health spending, partly due to the ageing population, will continue requiring more healthcare workers. Occupations in these areas require varying levels of education (usually including post-school qualifications), and all benefit from the cognitive and non-cognitive skills developed in secondary and tertiary education. The tertiary sector, in particular, must be prepared to provide the skills necessary for the care workforce to expand in coming years.

Although we can make predictions that skills in some broad areas will experience greater demand in the future, exact skill needs are hard to predict. Many occupations that will be created in coming decades may be hard to even conceptualise, relying on technologies that are yet to be invented — necessitating lifelong learning to update skills in response to changing technologies and occupational demands. Ongoing and continual learning will complement and transcend what occurs in traditional education institutions. In this context, it is important that the education sector remains dynamic and adaptable and that businesses have the internal capacities and incentives to train their employees.

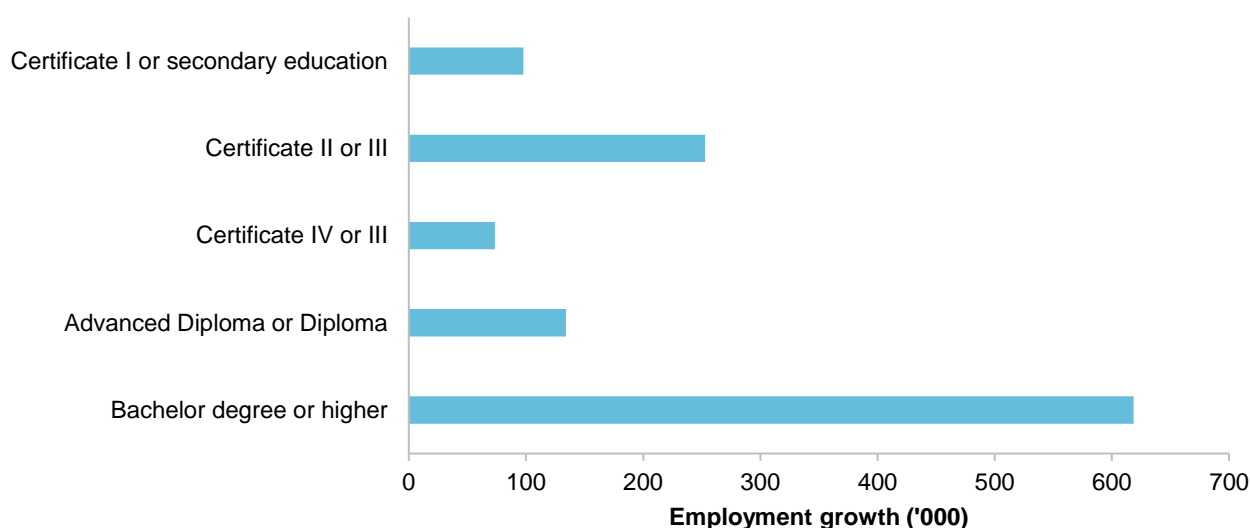
Figure 1.4 – Many job vacancies need higher qualifications than job seekers possess^{a,b}
Workforce Australia caseload and online job ads, by skill level



a. Workforce Australia caseload does not include all unemployed people. It also includes some employed people with low earnings. Workers with less than Year 10 education are not included. Caseload data as at 30 November 2022. **b.** Internet Vacancy Index data on online job ads are only based on a selection of websites. Multiple positions in a single advertisement will be treated as a single vacancy. Many jobs are not advertised online or at all, and this may be more likely to be the case for positions with lower skill requirements. Results have been seasonally adjusted. Vacancy data for October 2022.

Source: Productivity Commission analysis based on unpublished DEWR data and Jobs and Skills Australia (2022).

Figure 1.5 – Almost all new jobs over the next 5 years will require tertiary education^{a,b}



a. From the National Skills Commission Employment Projections, five years to November 2026. ‘New jobs’ refers to employment growth and does not include mobility between existing positions. **b.** **Certificate IV or III** includes Certificate III level qualifications that include at least two years on-the-job training. **Certificate II or III** includes Certificate III level qualifications that do not include at least two years on-the-job training.

Source: Adapted from NSC (2022).

1.3 The education sector context

Schooling in Australia consists of primary and secondary education, ranging from the Foundation Year to Year 12, with school attendance compulsory to Year 10. Of the 9600 schools, approximately 70% are run by State and Territory governments, with remaining schools operating as part of the Catholic education systems (18%) or as independent schools (12%) (ABS 2022, table 35b). In 2021, there were about four million students enrolled in primary, secondary and special education school across Australia (ABS 2022, table 42b).

Although a large share of learning occurs on the job, the tertiary education sector plays a vital role in providing both general and occupation-specific skills. The tertiary education sector can be divided into:

- **higher education**, comprising universities and other higher education providers (just under 200 providers in total)
- **vocational education and training (VET)**, comprising TAFE colleges and institutes, adult and community education providers, private providers, community organisations, schools, higher education institutions, commercial, industry body and enterprise training providers (over 4000 providers in total).⁸

The higher education sector delivers both generalist education and training for highly specialised professional occupations. Conversely, VET is mostly focused on targeted vocational training, developing skills for a particular job function or trade; but also plays an important role in developing foundational skills. Over recent decades, massive open online courses (MOOCs) and microcredentials have entered the market — often delivered by industry as well as higher education institutions — providing alternative avenues for skill formation.

How the sector is performing

Academic achievement of Australian school students has stagnated over the past decade. Student achievement is often gauged using results from the National Assessment Program — Literacy and Numeracy (NAPLAN) or the Programme for International Student Assessment (PISA) tests.⁹ Average PISA scores for both mathematics and reading have declined over recent surveys, while NAPLAN scores have been generally steady across all year levels. Recent Productivity Commission analysis suggests the fall in PISA results has been more modest than is commonly reported (PC 2023, pp. 57–58).

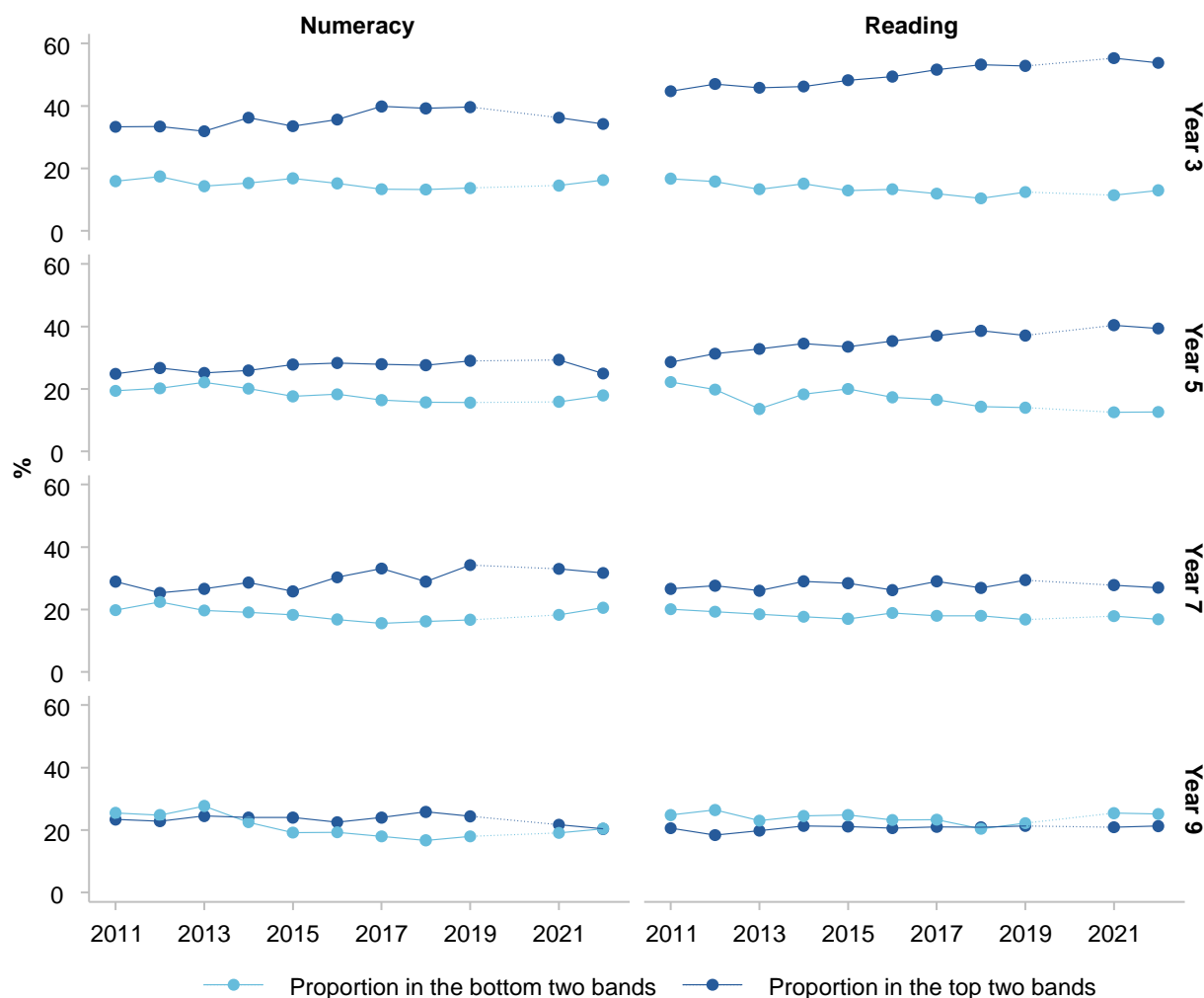
Overall student achievement can also be assessed by looking at ‘performance bands’ (figure 1.6). Performance bands represent increasingly challenging skill levels and correspond with increasingly higher scores on the NAPLAN scale. Prior to COVID-19 there was an increase in the proportion of high-performing students in primary schools in reading. Other than this, the proportions of students in the bottom and top performance have remained relatively constant across year levels.

The lack of improvement in academic results has been accompanied by a concurrent increase in the amount of money spent on schools (figure 1.7). Overall, gross school income per student has increased by nearly 20% in real terms since 2011, with little discernible improvement in test scores. A lack of improvement in such student outcomes may reflect where this additional money has been spent: school income per student from government sources for government schools increased by about 18% in real terms since 2011, while the increase was 34% for Catholic schools and 47% for Independent schools.

⁸ Based on the national register of vocational education and training (training.gov.au) as at January 2023.

⁹ NAPLAN is a national assessment taken each year by year 3, 5, 7, and 9 students, whereas PISA is an international standardised test for 15-year-old students — regardless of what year they are in at school — conducted each year by the Organisation for Economic Co-operation and Development (OECD).

Figure 1.6 – NAPLAN suggests that performance has not improved in recent years^{a,b}
Percentage of students in the top or bottom two bands, 2008–2022



a. NAPLAN testing was not conducted in 2020. **b.** Students assessed as being in the bottom two bands are at or below the national minimum standard. NAPLAN assessment scores for reading and numeracy can be grouped into 'bands' indicating proficiency in each domain. There are ten bands overall for each domain, with national minimum standards steadily increasing as year levels increase. Students are assessed as being in one of the six bands relevant to their year level, with band 2 the national minimum standard for Year 3, band 4 the minimum standard for Year 5, band 5 the minimum standard for Year 7 and band 6 the minimum standard for Year 9.

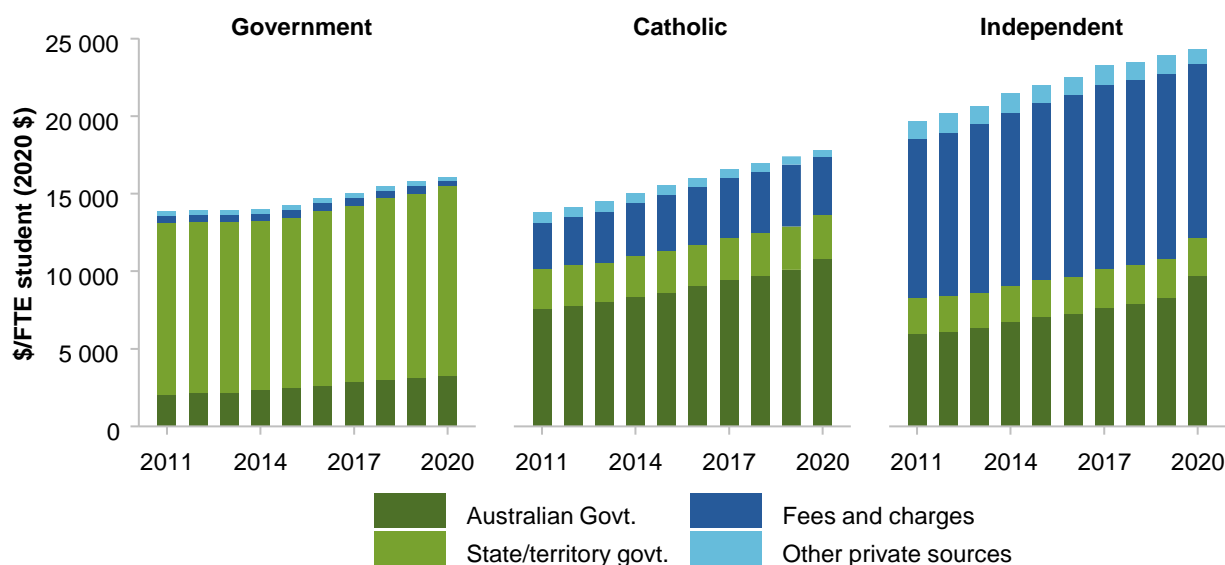
Source: ACARA *National Report on Schooling in Australia* data portal.

Australia's tertiary attainment rate is high, with more than half (54%) of 25-34 year-olds holding a tertiary qualification in 2021, well above the OECD average of 47% (OECD 2022a).¹⁰ However, a large share of students commence qualifications without completing them, raising the question of whether attainment rates could be improved, or the matching of students to different parts of the education system made more effective (chapter 3; chapter 4). For tertiary education, the best data available on performance quality comprises surveys on employment outcomes and student and employer satisfaction. These mostly point to reasonable and stable satisfaction, although there is room for improvement. In the years leading to the

¹⁰ Tertiary education is defined as Diploma and above under OECD classifications. For this volume more generally, tertiary education refers to qualifications that are Certificate III and above.

COVID-19 pandemic, university student satisfaction hovered around 80%, but it has fallen since the pandemic (SRC 2022b), likely owing to the rapid move online. Employer satisfaction is in the mid-eighties overall and over 90% in relation to technical and foundation skills — key aspects of university education. Government-funded VET qualification completers also reported high rates of satisfaction, averaging 88% over the past decade (NCVER 2022a).¹¹ In recent years, employer satisfaction with VET qualification holders has decreased, although it has increased slightly for university graduates (NCVER 2021; SRC 2022a).

Figure 1.7 – Spending on schools has increased^{a,b}
Gross income from different sources, by school sector



a. Total gross income excludes capital grants. **b.** Amounts are deflated using General Government Final Consumption chain prices (table 2A.26, SCRGSP 2022).

Source: ACARA National Report on Schooling in Australia data portal.

Most tertiary graduates find employment soon after completing their qualification. However, current cohorts do not appear to be faring as well in the short term as those a decade previously (figure 1.8). This may partly reflect temporary macroeconomic effects, rather than an indicator of poorer university performance. Indeed, in the medium term, there is little downward trend in labour market outcomes. More generally, it is difficult to disentangle the impacts of changing characteristics of the student intake and their course choices on labour market outcomes from the effectiveness of universities as training institutions.

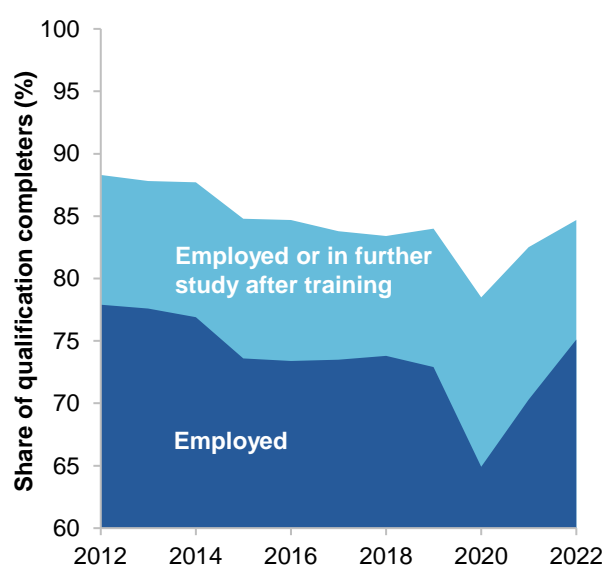
Still, even if the short-term declines cannot be attributed to the tertiary sector, they should prompt institutions to redouble their attention on improving student outcomes — to ensure they are able to support a student body with more diverse needs, and to prepare graduates for an increasingly challenging labour market.

¹¹ This does not capture students who do not complete their qualification, or the majority of students that do not receive government funding.

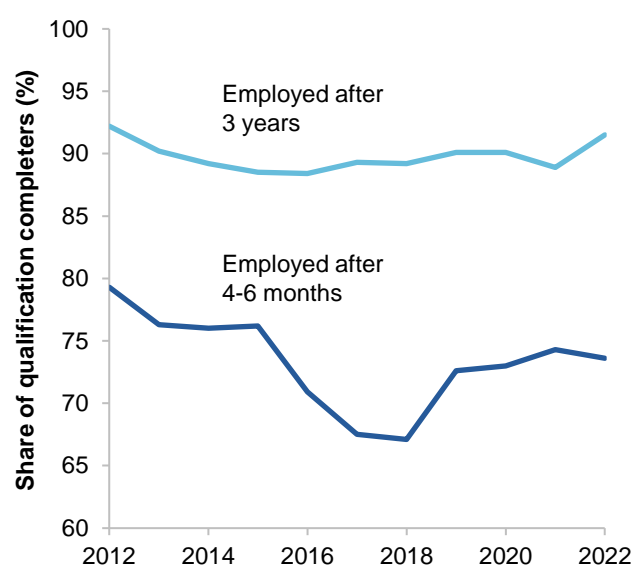
The sector is also not set up to meet rising demand for tertiary education. Those born during the ‘Costello baby boom’ of 2005–2008 will start to leave school shortly, dramatically increasing the population of potential students (figure 1.9). The higher education sector in particular will be unable to meet this additional demand under current funding arrangements (chapter 3).

Figure 1.8 – Changing trends in employment outcomes for VET and university graduates^{a,b}

Recent VET graduates employed or in further study, either full-time or part-time



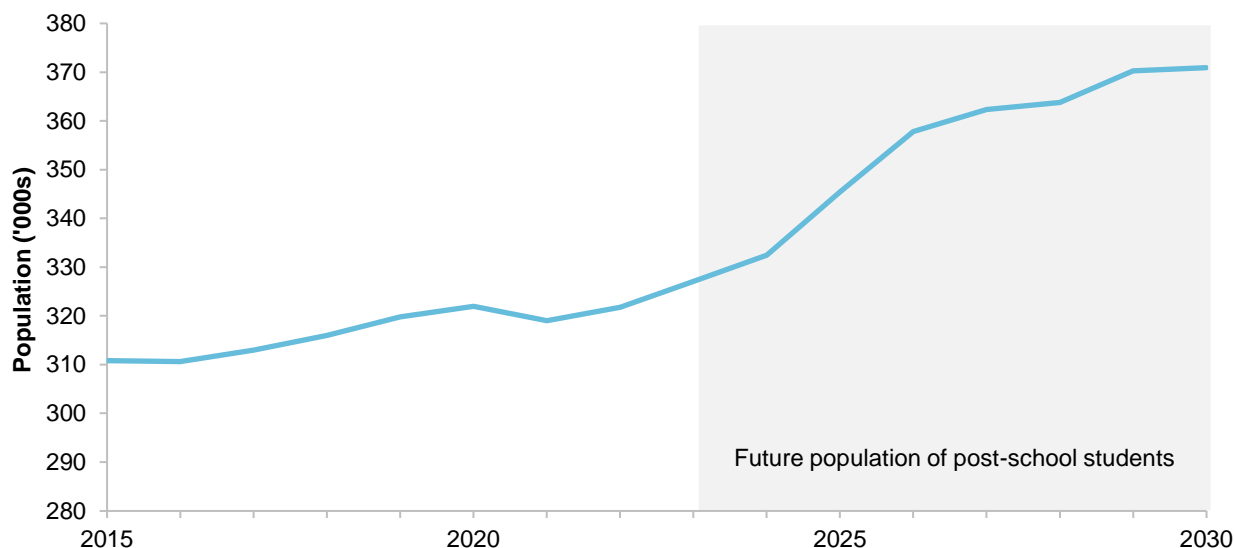
University graduates employed full-time after graduation



a. The NCVET National Student Outcomes survey is administered to VET graduates about 6 to 8 months after course completion. The QILT Graduate Outcomes Survey is administered to university graduates about 4 to 6 months after course completion while the Graduate Outcomes Survey – Longitudinal is administered after about 3 years. NCVET and QILT surveys are not directly comparable, including that the QILT Graduate Outcomes Survey does not report the share of graduates in employment or further study. **b.** NCVET National Student Outcome survey data include completed government-funded qualifications only.

Sources: NCVET (2021b); SRC (2022c).

Figure 1.9 – The population of school leavers will expand considerably in coming years^a
People reaching tertiary age over time



a. Population is projected from 2017 onwards. Projections do not account for the effect of COVID-19 on migration and may therefore be an underestimate, although most of the forecast growth comes from the domestic population.

Sources: ABS (*Population Projections, 2017 (base) — 2066*, Cat. no. 3222.0, table B9); ABS (*National, state and territory population, June 2022*, Cat no. 3101.0, table 59).

What this volume covers

Given the breadth of the education system, this volume of the inquiry does not review the sector comprehensively. There have been many reviews into various aspects of both school and tertiary education over recent years.

- School performance and student achievement were examined in the second Gonski review (Gonski et al. 2018), and there have been reviews of the Australian Curriculum (ACARA 2022c) and initial school teacher education (Paul et al. 2021). The Productivity Commission's Review of the National Schools Reform Agreement examined how well national policy initiatives by the Australian, State and Territory governments have achieved the agreement's objectives and outcomes (PC 2023).
- Recent reviews into the tertiary education sector have assessed the governance of the sector, including the role of the regulator ASQA (Braithwaite 2018); the higher education provider category standards (Coaldrake 2019); regional education (Halsey 2018; Napthine 2019); funding (PC 2019); and, the performance of the VET sector (Joyce 2019a; PC 2020c). The recently-commenced University Accord process will also consider many of these issues and is due to report in December 2023.

The early childhood family environment and quality early childhood education and care services can also be important for the development and future prospects of children, and lay the groundwork for effective education. However, this volume focuses on the school and tertiary education system.

Both the quantity of education delivered and its quality are important to Australia's ongoing productivity and prosperity. While there is evidence of a need for greater levels of skill formation, over time it may become more challenging to achieve productivity improvements solely through increases in the *quantity* of education (that is, the number of people attaining higher levels of education). Gains from additional years of secondary schooling have mostly been exhausted, and although additional tertiary students still benefit greatly from their education (Deming 2022, pp. 77–78), these returns could diminish over time. More people flowing

through the education system makes the *quality* of education — what people gain from the years invested — increasingly important. And increases to the quantity of education will only benefit additional students, while quality improvements can increase outcomes for all students. Getting better outcomes for a given number of years of education by raising its quality and better matching what is taught to emerging skill needs will become critical.

In this light, the remainder of this volume considers improvements that support:

- schools to provide the foundational skills required to improve economic performance, including through better use of technology in the classroom; diffusion of effective teaching practices; and experimentation with innovative school models (chapter 2)
- post-school education to develop the skills needed in the Australian economy, achieved through better targeting government investment and loan arrangements (chapter 3)
- better student outcomes in post-school education, by encouraging quality and relevant teaching and facilitating completion where it is in the best interest of students (chapter 4).

Appendix A provides additional detail on the performance of higher education providers. Appendix B details stylised whole-of-economy modelling undertaken by the Productivity Commission for this inquiry, which found that potential productivity improvements arising from improved education quality and better meeting skill needs could lead to increased real GDP and individual wellbeing.

2. Building productivity in schools

Key points

- * **Academic achievement among children is stagnating, and the productivity of schools has been declining in recent years. Improvements in the way schools work and the quality of teaching could improve both the productivity of the education sector now and, through improvements in the productivity of our future workforce, contribute to long-term, economy-wide productivity gains.**
- * **Flexible and innovative approaches to allocating school resources are key to an effective and adaptive school system.**
- * **Digital technologies hold significant promise when combined with appropriate pedagogical techniques — to augment teacher-led instruction, provide formative assessment of student progress and further replace manual school administrative processes.**
 - Digital technologies can also expand access to quality teaching and help address the challenges associated with teaching out of field.
 - But not all technology is necessarily effective. There is a role for government agencies to provide guidance to teachers and schools about digital learning options with proven efficacy.
- * **Credible evidence about educational best practice is key to supporting better outcomes for more students, including in their post-school lives. But having the evidence alone will not achieve this. Effective observation and feedback, and curriculum implementation support are important mechanisms for diffusing best practice into more classrooms.**
- * **Beyond what happens in the classroom, how schools operate affects student outcomes. In contrast to a fundamental progression evident in nearly every other sector of the economy, the basic model of school operation in Australia has changed little over the past century. An openness to experimenting with school models and evaluating what works has the potential to deliver long-term benefits.**

2.1 Lifting productivity in a stretched system

The role of education in developing the future workforce to foster productivity growth is broadly accepted. By contrast, applying a productivity lens to the operation of schools can seem foreign and can draw opposition. This chapter addresses both these aspects and recognises that there are multiple channels through which education can drive productivity. But it is also important to note that better school outcomes matter beyond productivity. A better school system will also have broader benefits to students' wellbeing. Education increases people's capabilities, makes society healthier, safer, better informed, more civically engaged, and fosters social mobility (chapter 1). The benefits of a more productive school system would support all of these aims.

Improving productivity in schools is about getting better quality outcomes for students from the inputs (teachers, other staff, and physical capital) or using these resources more efficiently for the same quality outcomes. Aggregate future productivity improvements are more likely to come from improving the quality of education received than from additional years spent accruing education (Primary Focus, sub. 56, pp. 11, 23).¹²

Improving teacher effectiveness is central to improving student outcomes. A teacher who is one standard deviation above the average teacher (in terms of their ability to increase student achievement), instructing a classroom of 15 students, could increase the average lifetime earnings of the classroom by about \$530 000 in a given year; or about \$35 000 per student (PC 2023, pp. 333–334). While an effective teacher can improve student lifetime earnings, a less effective teacher can have the opposite effect. Further, the effects on student lifetime earnings are cumulative: students that have an effective teacher one year followed by an equally less effective teacher the next year will experience no net gains (Hanushek 2011, p. 473).

School productivity has trended downwards

Although it is difficult to reliably estimate (box 2.1), school productivity has been trending downwards in recent years. Given the size of the sector¹³ and the role of schools in providing the building blocks of future human capital, any improvement in the way schools work is likely to result in future economy-wide productivity gains. There may be some immediate gains from improved productivity in the sector. But perhaps more important are the longer-term gains from improved productivity of labour across the economy more generally.

As system designers, funders and suppliers of formal school education, governments play a key role. To achieve a better functioning schools system geared to long-run productivity improvement, governments can:

- embed digital technologies into the classroom in a way that supports improved outcomes for students (section 2.2)
- strengthen and embed the mechanisms to diffuse evidence-based best practices in the classroom (section 2.2)
- encourage and support trials of different educational operating models (section 2.3).

¹² Nevertheless, it is likely that completing Year 12 will have benefits to the individual, their families and communities.

¹³ In 2021, there were over 9500 schools across Australia, employing over 300 000 teachers and 140 000 non-teaching staff (ABS 2022f).

Box 2.1 – Resources needed to educate a child have increased significantly over time, while school productivity has declined

Productivity is a measure of how well an organisation uses available inputs to achieve its desired outputs. Schools primarily seek to use their ‘inputs’ — capital (buildings and equipment) and labour (teachers and other staff) — to produce ‘outputs’ in the form of educational attainment, which can be broadly defined. It is hard to measure school productivity because it is difficult to measure output and to account for changes in its quality (PC 2021, pp. 25–26). The failure to properly account for improvements in quality and difficult-to-measure outcomes mean that simple measures of productivity can substantially underestimate productivity improvements (OECD 2001, p. 37).

The ABS experimental estimates of school labour productivity and multifactor productivity (MFP) (see figure below) do not account for changes in the *quality* of inputs or outputs, and so should not be seen as an authoritative measure of productivity. They simply provide an indication of how aggregate changes in the number of students educated relate to changes in the volume of inputs used:

- labour productivity compares the changes in the volume of services produced (full-time equivalent enrolments, weighted by costs) with the change in the volume of labour used (hours worked)
- multifactor productivity compares the volume of outputs to a measure of combined inputs; including labour, capital, and intermediate inputs (energy, materials, and purchased services).

As school education is a labour-intensive service, changes in multifactor productivity are similar to changes in labour productivity. Over the ten years to 2018-19, MFP fell on average 1.2% each year, while labour productivity fell on average 1.1% each year. This reflects that annual growth in outputs (about 1.3%) was less than the measured growth in inputs (about 2.7% each year for combined inputs). Approximately 65% of the decline in labour productivity and 60% of the change in MFP is attributable to the decline in student-staff ratios. If student-staff ratios had been held constant over the ten years to 2018-19, labour productivity would have declined by only about 0.3% on average per year (instead of 1.1%).

Some studies make adjustments for education quality. The Queensland Productivity Commission adjusted estimated productivity for the proportion of students that met the minimum standards. These estimates also used cost shares to weight schools by type (primary or secondary) or sector (Independent, Catholic, or government) and used total deflated revenue as the measure of inputs (Cornell-Farrow 2019, pp. 8, 26).

By this metric, school productivity in Australia appears to have decreased modestly, with an annual rate of decline (across Australia) of about 0.14% between 2009 and 2016 compared with 0.72% growth of MFP in the market sector (16 industries) over the same time period (ABS 2022b; Cornell-Farrow 2019, p. 22).¹⁴ Nevertheless, achievement of minimum standards is still a narrow indication of education.¹⁵

¹⁴ Market sector multifactor productivity (MFP) differs from the school productivity measure used here in that the former used labour and capital inputs weighted by their cost shares while the latter uses total revenue deflated by the Government Final Consumption Expenditure implicit deflator. Also, the market sector figures use financial years ending in those years while the Queensland Productivity Commission figures use calendar years.

¹⁵ It does not cover important aspects of school education, including student engagement and student wellbeing, that should be considered in the context of productivity estimates.

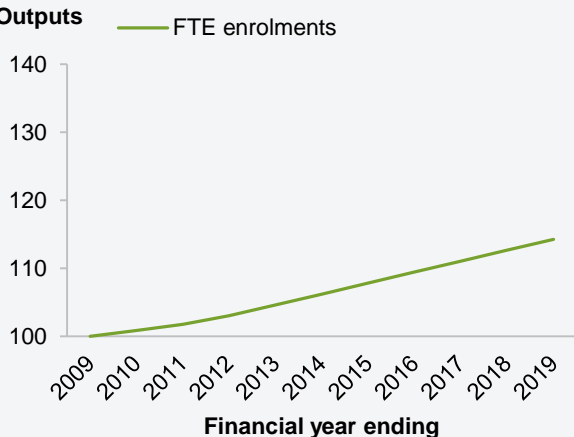
Box 2.1 – Resources needed to educate a child have increased significantly over time, while school productivity has declined

Overall, the evidence suggests that the resources required to educate a child have increased significantly over time, and that when quality adjusted, there is likely to have been a modest decline in productivity in the sector.

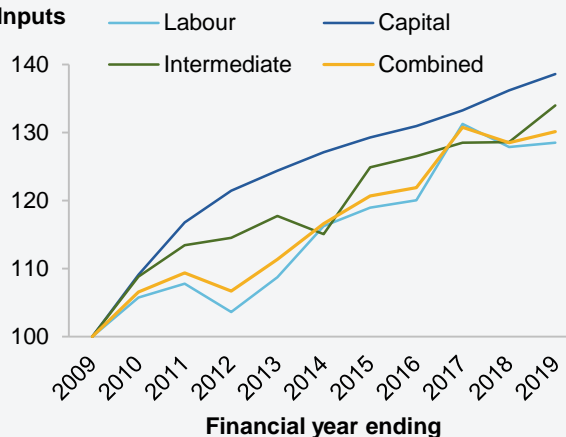
Inputs and outputs in the school sector

Index value 2008-09 = 100

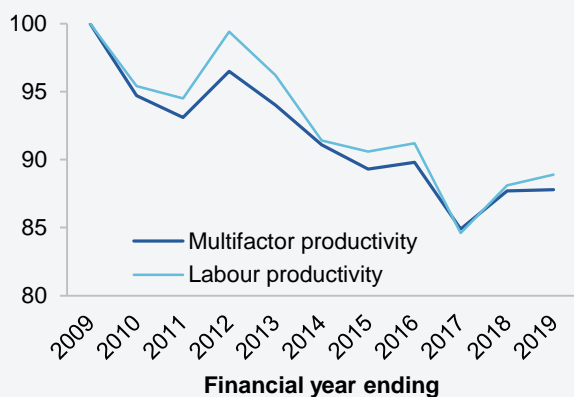
Outputs



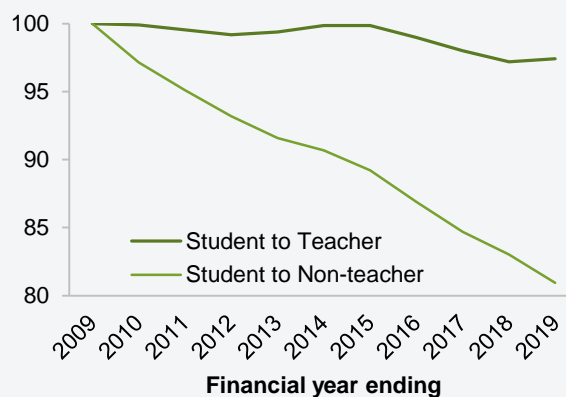
Inputs



Productivity indices



Student-to-staff ratio



Source: ABS (*Experimental school education multifactor productivity estimates*, September 2021, Cat. no. 8104.0).

A stretched system is less adaptive

Schools and teachers are bound by an array of policies and requirements intended to improve student outcomes. This architecture has been developed over time to enable all students to access high quality education. The COVID-19 pandemic demonstrated schools and teachers can adapt when they must. They responded quickly, transitioning teaching online across all year levels and adjusting teaching practices to manage risks of COVID upon students’ return to schools.

There is some adaptive capacity in the system, but simultaneously a lack of readiness or capacity to shift resources more fundamentally in search of better outcomes. There is evidence and research on what works

both in the classroom and at the school level, but current approaches and resource allocations — which concentrate most tasks at the teacher level — leave little time for staff and practices to adapt, experiment, and pick up innovative and evidence-based approaches.

The teacher's role is increasingly complex

Teachers play a critical part in the education system and are the single largest 'in-school' factor contributing to student outcomes (figure 2.2). The teacher's role is broad ranging — encompassing understanding students and how they learn, as well as knowing subject content and how best to teach and assess it. Beyond this, the *Australian Professional Standards for Teachers* require teachers to maintain a safe learning environment, provide feedback and report on student learning, interpret student data, communicate and engage with parents, communities, and colleagues, and undertake ongoing professional learning (AITSL 2018). Communities value and expect that, as part of a well-rounded education, teachers support the physical and mental health of students, cultivate critical and creative thinking, personalise learning, report on progress, and use data to support learning.

A teacher's role and how they teach students is arguably becoming more complex and demanding. This reflects an increased need for, and recognition of, personalised and inclusive education, as well as increased administrative burdens that stem, in part, from the accountability necessitated by greater school autonomy.

A more customised learning experience (as opposed to teaching to target the average student) means that teachers need to understand a student's prior knowledge, and tailor instruction, assessment, and feedback to their needs. The skills, capability, and time needed for teachers to personalise learning is significant, particularly given there is often a large spread of ability within classes. For example, the Productivity Commission found an average 4-year learning gap in numeracy in individual schools (PC 2023, pp. 5, 82).

Schools are also more diverse than they used to be, as classes consist of a broader range of abilities and backgrounds. Inclusive education, while valuable to student outcomes of both those who do and do not experience disability (CYDA 2022, p. 1), requires extra training, and takes time and skill to do well, adding to the complexity and intensity of the work of a teacher (Australian Education Union, sub. 21, p. 9).¹⁶

The OECD Teaching and Learning International Survey data shows that Australian lower secondary classrooms have a higher proportion of students with special needs and migrant backgrounds, and more non-native speakers and refugees than the OECD average (Thomson and Hillman 2019, p. 48). The Australian Curriculum, Assessment and Reporting Authority (ACARA 2022d, p. 7) highlighted the limited resources to address diverse teaching needs:

... teachers are working with diverse classroom environments in terms of their students' ability levels, socio-economic backgrounds and demographic composition. In addition, many systems face budget constraints which limit the amount and quality of support available to teachers to face these new challenges and demands.

Teachers increasingly need to gather data as evidence of student learning or to demonstrate their own capabilities for accreditation against the *Australian Professional Standards for Teachers*. Many teachers find locating the right information and documenting accreditation time-consuming and challenging, and multiple systems and agencies have resulted in duplication (NSW Department of Education 2021b, p. 10).

Some have argued that school autonomy has increased teacher workload due to reduced centralised support and increased reporting requirements. School autonomy offers devolution of responsibilities from

¹⁶ Inclusive education recognises the right of every student to be included in a general education setting — adapting the environment and teaching approaches to ensure genuine and valued full participation of all students.

large government departments to schools — aiming to empower them to operate more efficiently, effectively, and produce better outcomes. Indeed, the World Bank concludes that most countries whose students perform well give their schools substantial authority to shape local education provision and determine the allocation and management of resources.

However, an emerging consequence has been the increased workload outcomes of heightened accountability and teacher ‘responsibility’ combined with greater work intensification. Indeed, higher administrative and accountability requirements supporting increased school autonomy are among the ‘primary sources of compliance and administrative requirements’ (AITSL 2020, p. 4). ACARA (2022d, p. 7) noted that:

... schools are arguably becoming more bureaucratic, teachers report having weak work autonomy in their daily activities and being overloaded with non-teaching activities, especially administrative tasks.

Teachers are impeded from focusing on the highest value tasks

Some teachers are working long hours, with estimates ranging from 44 to 57 hours per week for full-time teachers in term time. Yet these long hours in term time are often spent on low value — albeit necessary — tasks, preventing teachers from meeting the complex expectations of teaching. Teachers and principals report that teaching and learning is hindered by their high workload during term time (Hunter, Sonnemann and Joiner 2022, p. 16; McGarth-Champ et al. 2018, p. 2).

Further, a 2021 representative survey of teachers and school leaders found that over 90% of teachers surveyed reported they did not have enough time to prepare effectively for classroom teaching (Hunter, Sonnemann and Joiner 2022, p. 13). This view was largely backed by school leaders, with 77% agreeing that teachers in their school either ‘always’ or ‘frequently’ do not have enough time to prepare for effective teaching (Hunter, Sonnemann and Joiner 2022, p. 13).¹⁷ Monash Q Project¹⁸ and Australian Learning Lecture also highlighted that meaningfully integrating research about best practice into lesson planning is complex skilled work that teachers struggle to dedicate sufficient time to (sub. 160, p. 8; sub. 124, p. 6).

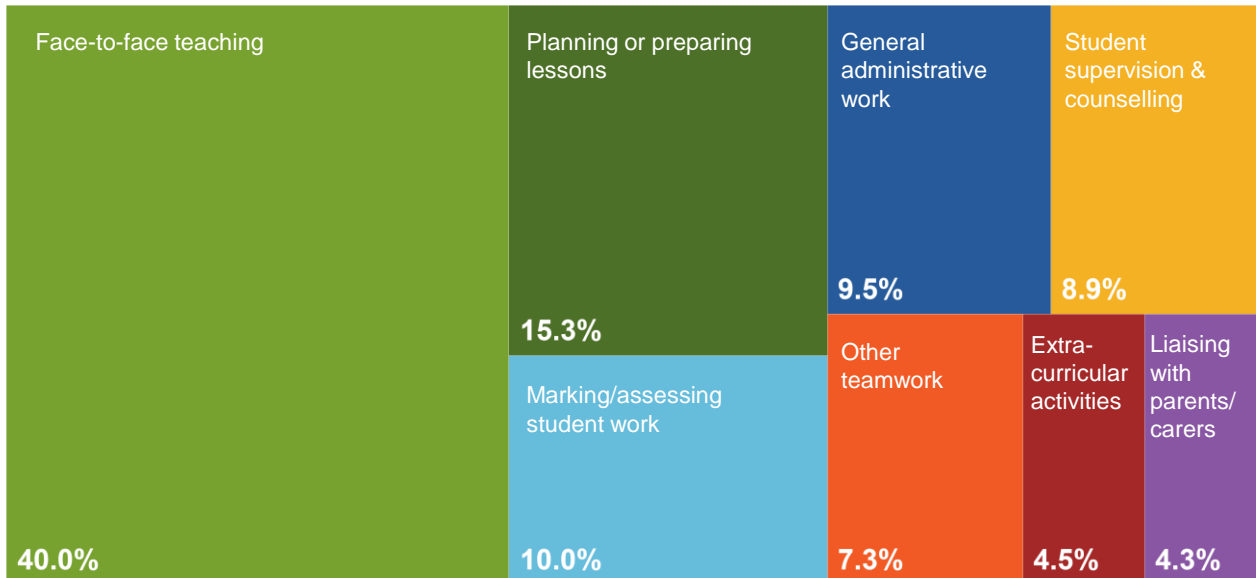
Face-to-face time represents just one element of a teacher’s week (figure 2.1). Full-time classroom teachers spend about 21 to 24 hours in face-to-face teaching in a typical teaching week (AITSL 2021, p. 66). One teacher observed how their day is filled with a breadth of tasks:

My days are filled with behaviour management, the bombardment of emails, writing programs, marking work, giving feedback, reporting to parents, setting student goals, writing individual programs, attending meetings and professional development to remain registered. And, dare I forget, the uploading of data into the system before the deadline. If only I could just teach! (Stroud 2022)

¹⁷ Preparing for effective teaching was defined to include planning for classroom instruction; preparing, marking, and analysing student assessments; preparing student feedback and adapting teaching; preparing to support struggling students; building professional knowledge and skills; and collaborating effectively with colleagues and experts.

¹⁸ The Monash Q Project is a five-year study in partnership between Monash University and the Paul Ramsay Foundation with the aim to better understand and improve the use of research in Australian schools (Monash Q Project, sub. 160, p. 2).

Figure 2.1 –Time teaching face-to-face is only one part of a teacher’s week^a
Average proportion of weekly hours spent on teaching tasks by full-time teachers, 2018



a. Survey respondents are from New South Wales, South Australia and the Northern Territory. Figure includes responses for full-time workers only.

Source: Australian Teacher Workforce Data Teacher Survey 2018.

High-value non-teaching tasks enable teachers to track and analyse students’ progress, inform parents of their child’s achievement, and maintain and improve their professional practice (NSW Department of Education 2021b, p. 2). But some teacher time is spent on tasks that are overly burdensome or do not actively support quality teaching — almost 10% of teacher time is spent on ‘general administrative work’ (such as manually processing forms or checking attendance) (figure 2.1). In a COVID-affected environment, teachers have also been managing health regulations relating to rapid antigen tests for students. One teacher reported that planning time was reduced to hand out COVID-19 tests, reflecting the opportunity cost of adding tasks to a teacher’s workload:

... this year I have spent hours of planning time handing out RATs to students, a task that anyone could do. Why am I doing this? Our deadlines are not extended when planning time is taken away because we’re expected to use our weekend to catch up on work. (Stroud 2022).

The New South Wales Government acknowledged, following a review of teachers’ workload, that too much time is spent on low-value administrative work.

We have heard from teachers and principals that too much time is spent on low-value administrative work that is overly burdensome, such as manually processing forms. Teacher time needs to be redirected to high-value tasks, such as adapting and differentiating lesson content and resources for the individual needs of their students. (NSW Department of Education 2021b, p. 2)

Whatever the cause, long working hours, high work intensity, and a lack of recovery time have been shown to impair not only teachers’ own wellbeing but also their motivation and ability to provide high-quality instruction (Boeskens and Nusche 2021, p. 14; Australian Education Union, sub. 21, p. 2). This compromises student outcomes. Supporting a better allocation of teacher time to make the most from their skills and qualification would help support quality teaching and student learning.



Finding 8.1

Making time to adapt and deliver best practice will require better allocation of school resources

Teachers' roles have become more complex, with increasing demand for provision of a high quality, evidence based, personalised, and inclusive education that reflects and accommodates diversity in the needs of students.

Current use of resources across the system leaves teachers stretched. Enabling teachers to focus on quality teaching vital to student outcomes would require more efficient and innovative use of school resources — including teachers, other school staff, and technological solutions — to support better student outcomes.

Educational needs and demands on the role of teachers will continue to evolve with changes in the economy and future workforce needs, and so there needs to be scope to test out innovative approaches to teaching and learning.

2.2 Working smarter to improve student outcomes

The Productivity Commission's education policy reform directions are primarily focused on influencing the adoption of best practices in education (in both classrooms and schools) and enabling innovation in how schools operate. There is a poor connection between education policymaking and implementation in the classroom, and some participants have advocated that a better understanding of classroom practice is essential to designing effective education policy (PC 2023, p. 198).

Improved productivity in schools can be achieved through various means, such as:

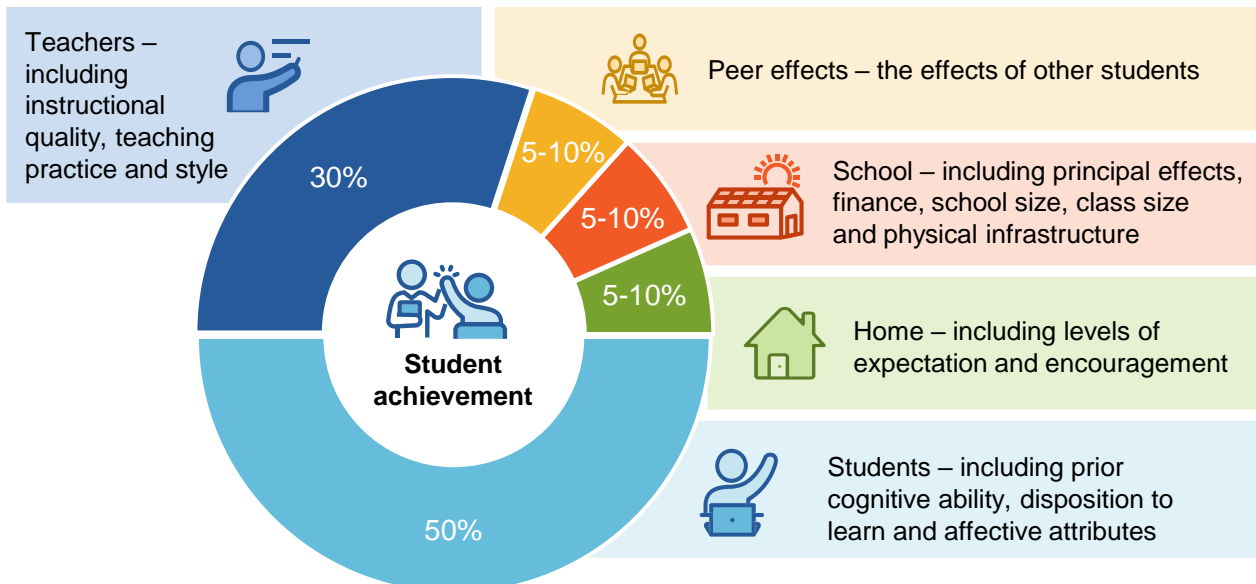
- **Better resource allocation:** improving the use of all school staff so that teachers can focus their time and effort on high-value tasks, with lower value tasks allocated to other school staff
- **Higher quality teaching:** shifting the overall quality of teaching will benefit all students, and have a greater impact on those who are struggling and at risk of falling behind
- **Ongoing diffusion of best practice:** using various mechanisms with flow-on impacts to classroom practice across all schools, including by leveraging effective digital technologies.

Some of the recommendations proposed in the following sections could be initiated in the short to medium term (for example, improving use of digital technology, and implementing better observation and feedback practices in schools). But they also have long-term implications for the productivity of both the school system (that is, getting more out of the resources used) and the broader economy, as students who benefit from such reforms will ultimately become more active and productive members of society. Looking further ahead, experimenting with the school model and trialling innovative approaches (section 2.3) could ultimately have a transformative effect for some schools and students.

Improving use of staff is key to better outcomes

School outcomes are influenced by a range of factors inside and outside of school (figure 2.2). While young people's personal attributes and home environment strongly influence how they perform at school, the act of teaching and the attributes of the teacher make a big difference, explaining about 30% of the variation in student achievement.

Figure 2.2 – Variation in student achievement is explained by a range of factors inside and outside of school^a



a. Student- and home-level factors are affected by the child's and family's wellbeing, which are influenced by the family's context and environment and broader policy settings. The relative effect of these factors is likely to differ by cohort and environment.

Source: Productivity Commission (2023), adapted from Hattie (2003).

Staff salaries in government schools account for approximately 64% of total in-school expenditure (ACARA 2022a, p. 104).¹⁹ As education is labour-intensive, making the best use of the staff in schools is critical to achieving the objectives of the education system with the resources available.

However, the way we conceive of teaching can constrain its quality:

Teaching is also constrained by old ways of thinking. Despite the growing recognition of demands on teachers' workloads, their work is still often measured by their physical presence in the classroom. Everything else that enables successful lesson delivery such as lesson planning, learning design, marking, and assessment, is often unacknowledged and undervalued. (Australian Learning Lecture, sub. 124 p. 6)

The future vision of the role of the teacher and their most valued tasks is shaped, and possibly limited, by the system that is currently operating. Given the current complexity of teaching, choices need to be made about how limited staff time can be used most effectively. Considerations include: the relative effort afforded to each task; the best way to do each task; and, how teachers can be supported by other resources (such as other staff, infrastructure, and technology).

Better use of non-teaching staff

The mix of different types of staff in schools, their responsibilities, and how they are managed can deeply impact the use of teachers (Boeskens and Nusche 2021, p. 67).²⁰ For example, teaching assistants, by providing increased attention on certain students, can have a positive effect on cohesion in the classroom,

¹⁹ Teacher salaries make up about half of all in-school expenses and about 80% of salary costs. In-school expenses include the user cost of capital as well as those that relate to teaching, learning, school administration and library functions.

²⁰ Schools employ a range of staff in addition to teachers and school leaders, including teaching assistants, administrative staff, maintenance staff as well as specialist support staff (such as guidance counsellors and school librarians).

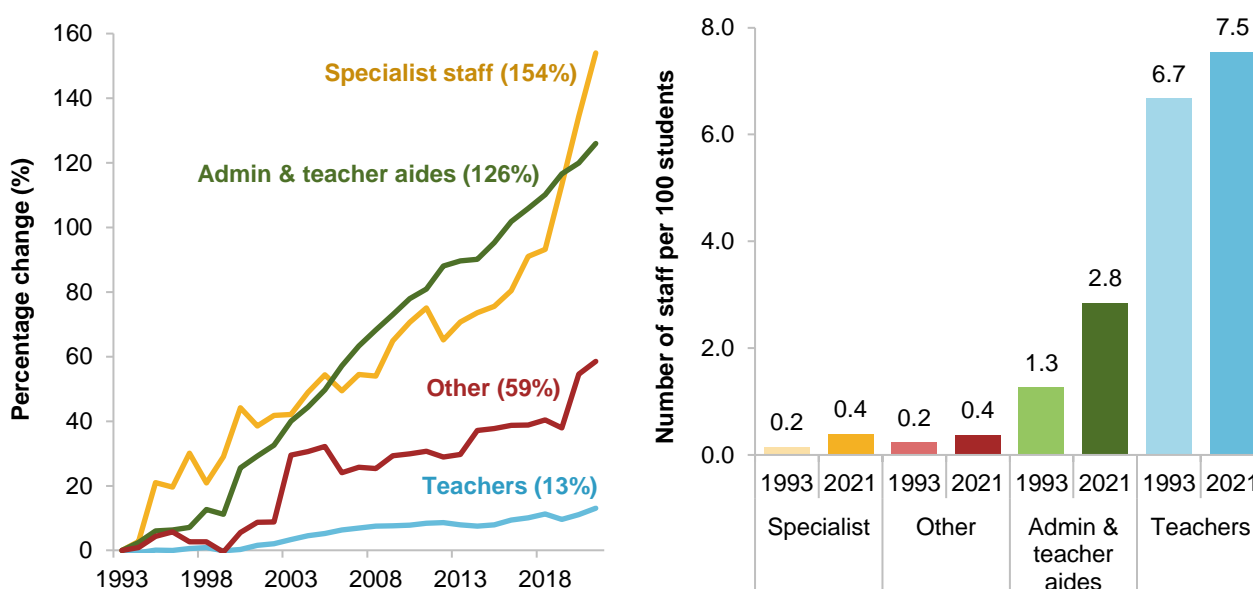
reduce disruption, and allow more time for teachers to teach (Evidence for Learning 2019a, p. 7). Additionally, administrative staff can free up teachers to focus on core teaching functions by doing tasks such as processing excursion permission slips (Evidence for Learning 2019a, p. 7).

Options such as delegating low-value tasks and changing task allocation between types of staff are not revolutionary but nevertheless could, if applied on a widespread basis, help teachers better use their time and focus on activities that have the greatest positive impact on student learning.

Over the past 30 years, all categories of non-teaching staff have grown considerably relative to students (from a very low base), while the growth in teaching staff has been somewhat lower (figure 2.3). This increase in school staff has occurred at the same time as the intensification of teacher workload.

Figure 2.3 – A greater diversity of types of staff in schools^a

Change in staff to student ratio between 1993 and 2021



a. Administrative staff and teacher aides include classroom assistants, library assistants, teacher aides, bursars/school administrators, IT support staff, and accountants. **Specialist Support Staff** include student support services, such as career advisers, student counsellors or liaison officers; educational development, such as staff and curriculum development; school psychologists and social workers. **Other** includes janitors, building or grounds maintenance staff, technical services and general maintenance staff, school nurses, and canteen workers.

Source: ABS (*Schools*, various years, Cat. no. 4221.0, table 51a).

Rather than more staff overall, what may be required is the better use of existing non-teaching staff, particularly teaching assistants.

The research on the impact of teaching assistants in Australia is not extensive. Considerable research in the United Kingdom over the past decade or so provides some insight on where Australia may look to improve how teaching assistants are used in classrooms. Indeed, the deployment of teaching assistants has not typically improved student outcomes in the United Kingdom (Evidence for Learning 2019a, p. 14). Evidence for Learning recommended focusing on moving away from teaching assistants substituting as teachers for students with highest needs, toward being a general class resource helping teachers better accommodate all students (Evidence for Learning 2019a, p. 14).

The Productivity Commission’s review of the National School Reform Agreement (NSRA) found governments should seek to better understand teachers and school leaders’ perspectives on what teaching assistants’

role should be, and how to best prepare teaching assistants for their role (PC 2023, p. 235). AITSL's submission to this inquiry has echoed the need to clarify and understand the role, use, and impact of other school staff, and develop an evidence base on best deployment and support mechanisms (sub. 146, p. 6).

Improving student learning with digital technology

Technology has fundamentally changed the way students learn, teachers practice their profession, and schools operate. It has evolved from one computer for the school, to one per class, to personal devices operating in networked schools that wirelessly save outputs to the cloud and enable sharing with teachers and other students.

Historically, public discussion on the use and spread of technology in schools has focused on hardware, perhaps motivated by a sense that access to computers would help students learn about technology. In fact, future gains in educational outcomes will likely come through software, as applications get integrated into classroom practice and technology is used to augment the teaching of 'traditional' core subjects like maths, reading, or history (OECD 2021c, pp. 15–17). Three broad categories of education technology (EdTech) that offer the most promise to improving student outcomes (Loble and Hawcroft 2022, pp. 21–22) are:

- **student-oriented applications:** intelligent tutoring systems that create personalised learning paths for students that adapt as they progress and encourage them to reflect on their learning
- **teacher-oriented applications:** 'smart' curriculum tools using AI to bring evidence-based resources directly to teachers for lesson planning and assessment
- **system-oriented applications:** AI-based modern data techniques (such as machine learning) can empower schools and systems to more accurately identify students at risk of disengagement and intervene in a timely and targeted way.

Opportunities to improve student learning

Digital technologies offer an array of new possibilities to support student learning, including providing opportunities for learning unconstrained by space or time and providing access to learning tasks that were not previously possible (box 2.2). Technology can support students of different abilities and/or learning paces through personalised learning programs, where students work through material in an online application (supported by a teacher) (Major, Francis and Tsapali 2021, pp. 1938–1939).

Online apps present information to students using varied methods (such as passages of text or video) to cater for the different ways students prefer to learn. In this way, technology can increase student engagement by making learning more appealing, such as using game-based learning or virtual reality. Students can be engaged with learning in a playful and dynamic way using principles of competition, points, incentives, and rewards. For example, Mathletics provides students with animated maths activities and challenges that allow students to earn rewards for correct answers, consistency of work over a number of weeks, and participation in live competitions (3P Learning 2014).

Box 2.2 – A framework for integrating technology into student learning

The *Substitution, Augmentation, Modification, Redefinition* framework outlines how digital technology can be integrated into student learning with reference to traditional teaching methods or materials (Terada 2020). Although the distinction between categories can be unclear at times, the use of digital technology in teaching can be classed as fitting into one of four levels:

- *substitution*: Technology acts as a direct substitute replacing traditional material with no functional change. For example, lessons and worksheets are converted into PDFs and posted online for students to access rather than a paper version distributed in class
- *augmentation*: Technology acts as a direct substitute with some functional improvement to enhance learning. For example, worksheets that are converted to PDFs may also include hyperlinks to additional material or have a media clip embedded for students to watch
- *modification*: Technology allows the learning task to be significantly redesigned. For example, allowing students to ask their teacher questions through a chat function as an alternative to orally
- *redefinition*: Technology allows for the creation of new tasks, previously inconceivable. For example, a school 400 kilometres south of Darwin used cameras to locate spiky pokipain (echidna), which had not been seen in the region for years (Fitzgerald 2022).

Digital technology can also be more adaptive to new learning content. In the past, textbooks would be set and used for years, and it could take some time for new information to be reflected in these books. Online programs, including digital texts, can be updated with new information in a much shorter cycle than physical learning materials. Further, digital texts can provide access to information and specialised material beyond what is in a textbook using the internet (OECD 2022b, p. 78).

In some ways, the future role of technology in school education could be similar to the role it has played in advancing the quality of health care provision over the past century (Ambinder 2005, pp. 54–56; HATI International 2017).²¹ Digital technologies can more easily ‘scale up’ practices across schools and potentially present a lower cost option to augment teacher capabilities. Augmenting inputs can support teachers in lesson delivery, for example — and in some cases replace low-value tasks such as by automating administrative processes.

Supporting teachers with digital technology

With expanded access to resources and knowledge, students may become less reliant on the teacher during class time, potentially freeing up the teacher to focus on students with greater learning needs during lessons, and reduce the amount of planning time required for each class.

Digital technologies can aid teachers in a range of activities, including planning and presenting lessons, sharing resources, individualising lesson plans, and assessing students. They can also support other tasks that are separate from learning activities, such as administration, and aid communication with parents.

²¹ The increase in precision and accessibility of medical imaging technology (such as MRI scans), for example, allows doctors to find diseases in their early stages — leading to better outcomes for patients (PBMC Health 2018). When combined with other technologies, such as artificial intelligence, further quality improvements can be achieved (such as better diagnoses) along with easing the workloads of radiologists (Walach 2022).

Formative assessments that use digital technologies may help teachers move away from a resource-intensive, paper-based practice to one that is more streamlined and provides support to the teacher in analysing individual learning progress and common trends in the classroom (table 2.1).²²

Table 2.1 – Technology can support teachers in their formative assessment practice

	Traditional approach	Technology-enabled approach
Teaching & learning	The teacher develops their own resources (or utilises centrally provided resources).	The teacher uses existing digital content or interactive applications.
Assessment questions	The teacher creates paper-based assessments, using a photocopier outside of class time.	The teacher can select from pre-existing assessments or create their own, distributing assessments digitally and quickly.
Administer assessment	Students can only sit paper-based assessments if in school. Students who are not present miss the assessment.	Students sit the assessment digitally, available through an app or browser. This flexibility enables students to take assessments 'on-demand', as opposed to having to be present in the classroom. Other issues, such as managing potential cheating, need to be managed, but technology can help with this too.
Mark assessments	The teacher marks each student's responses on paper with pen.	The teacher retains the ability to mark papers individually but could make use of automatic marking solutions, such as self-marking quizzes.
Student Feedback	Students physically receive their returned assessment, graded by the teacher. In some instances, the teacher will provide additional written feedback.	The teacher can provide individual feedback and make use of voice notes and/or video to provide richer, deeper feedback to students.
Data Capture & Storage	The teacher stores data in a spreadsheet, manually inputting individual student scores.	The teacher can use assessment platforms to automate data capture, which can be shared more widely with other staff members or with parents.
Gap Analysis & Spotting Trends	The teacher analyses the scores manually, looking for knowledge gaps or trends in performance.	The teacher can intelligently analyse student performance, either at an individual level or across cohorts (pre-determined such as year groups or custom groups).

Source: Edtech Impact (2022).

While formative assessment can be done manually by teachers, software can potentially automate repetitive, time-intensive tasks such as marking student assessments and provide more granular insights into student learning. Students are likely to experience greater benefit where 'individualised feedback is provided instantaneously and more frequently' (Lane et al. 2019, p. 13). The potential benefit of this area is recognised with formative assessment included in the eight policy initiatives in the NSRA (DESE 2021d).

²² Formative assessment encompasses both formal and informal assessment procedures that are used to modify future teaching and learning activities.

Digital technologies can also assist in monitoring student engagement in learning activities. Teachers are able to monitor whether materials have been accessed and which questions have been attempted and answered correctly, providing feedback about active participation with assigned tasks.

Digital technology can reduce teacher administrative load

Replacing administrative tasks via automation is likely to be welcomed by teachers and school staff to the extent that it removes or simplifies tasks that are often tedious or time consuming, and do not necessarily directly contribute to student learning. Examples include:

- a phone accessible interactive portal that lets parents give permission for their child to attend an excursion (with email or text message reminders for parents so they do not miss the due date, which would otherwise require teachers to follow up with a phone call)
- an application that can efficiently book a series of parent-teacher interviews, at mutually convenient times with minimal need for teachers to manage the process.

Implementation of digital technologies for administrative purposes needs to consider staff (including non-teachers) workflow, staff training and skill requirements, interoperability of systems and successful transition from paper-based systems. A shift from total to partial reliance on paper-based administrative tasks can require staff to manage more administrative processes, actually increasing workflow.

In a UK survey, the majority of headteachers (74%) and teachers (65%) indicated that technology already had, or would in the future, contribute to reduced workload (CooperGibson Research 2021, p. 14).²³ Where there is concern about increased workflow, schools (or governments) may wish to consider the scope for a cap on the total administrative tasks (or hours) teachers are doing, to ensure that technology replaces or simplifies tasks rather than creating new ones.

But there are challenges for schools ahead

While better use of staff and technology represent some immediate ways to lift school productivity, consideration must be given to the associated implementation challenge in an already stretched system, and on ensuring that technology works for the benefit of students and teachers.

School staff need to be digitally competent

Technology is not a silver bullet, and with it comes challenges for teachers, principals, and school administrators. Many people working at schools did not learn digital skills while at school themselves — teachers will need support to integrate digital technology effectively into their teaching practices, and schools will need support to identify the best products to deliver the desired benefits to their students. Being able to teach students digital skills requires:

... developing the technical skills of educators first rather than assuming (incorrectly) that they have the skills already, then the specific pedagogical approaches for digital skills, and finally integrating digital skills deeply and authentically in their own disciplines. (Grok Academy, sub. 185, p. 4)

The same challenges apply in using digital technology in the classroom environment. The COVID-19 pandemic opened the school system to change, but the challenge ahead is to retain the benefits of these approaches, rather than reverting to previous operating models.

²³ The Commission could not find similar data for Australia.

While there remains scope for schools to extend the use of technology and improve the use of existing technologies, past studies have shown that its use does not always lead to better student outcomes (OECD 2022b, p. 27). The Australian Education Research Organisation (AERO) noted:

One area in which considerable investments are being made with an inadequate evidence-base is education technology ... Rigorous evaluation of the features which make such technology effective, and evidence-based quality assurance of education content, would be wise prior to their implementation at scale. (AERO 2022, p. 2)

Teachers' training and ability to integrate technology into teaching processes is also key (OECD 2022b, p. 79). For example, the effective use of formative assessments that involve digital technologies requires both assessment knowledge and data literacy, meaning that deriving beneficial learning outcomes from the technology needs an increased focus on the use of digital technologies in initial teacher education and teacher professional development.

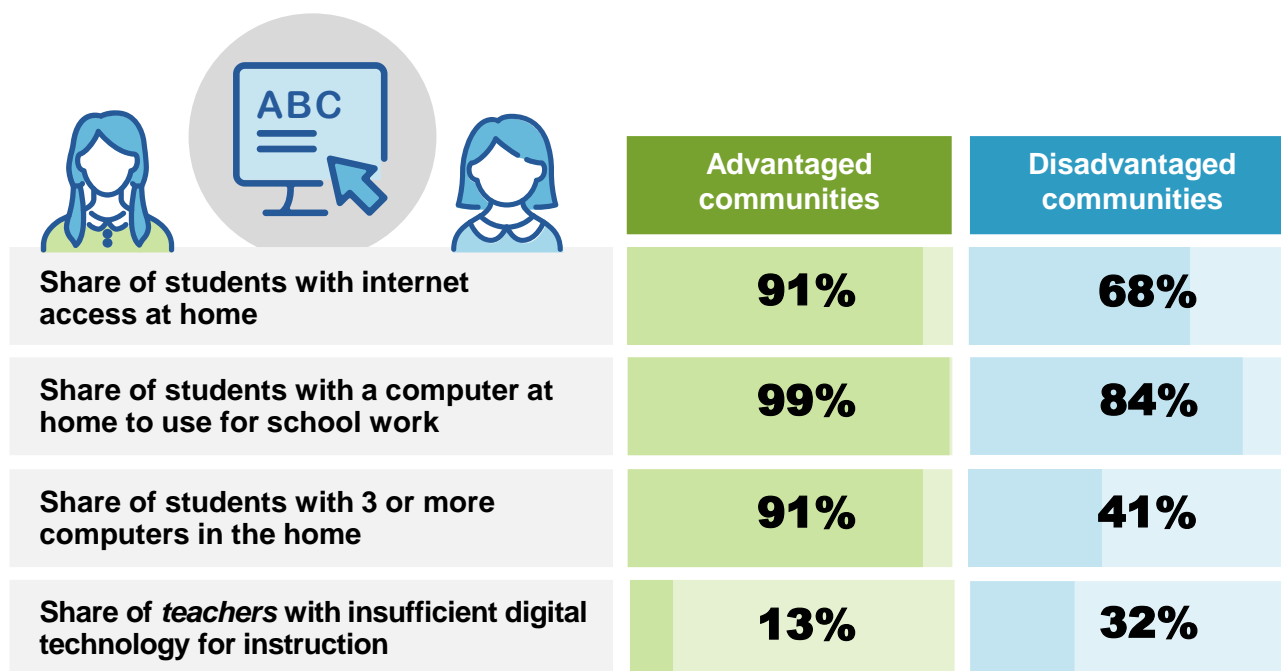
A digital divide in learning persists

Inclusion remains an important consideration in formulating approaches to the use of digital technology in schools. The COVID-19 pandemic focused attention on the challenges education systems face in addressing the 'digital divide': structural differences in the ability of students to access and effectively use digital technologies. There are substantial differences in access to technology (for students and teachers) between advantaged and disadvantaged communities (figure 2.4).

Meaningful digital inclusion depends on more than just access to devices and functioning broadband.²⁴ Students and teachers need to have the knowledge, skills, and motivation to make the most of the technology offered. The 'digital use divide' exists between students who use digital technologies in active and creative ways to support their learning, and students who use them for passive content consumption (Vlies 2020), and there are also gaps in access to these opportunities between socioeconomic groups (Thomson 2020). These challenges make the implementation of EdTech complex, and therefore it needs to be properly designed, used, and regulated to have a demonstrably positive impact on learning outcomes for disadvantaged students (Loble and Hawcroft 2022, p. 8).

²⁴ The Australian Digital Inclusion Index (ADII) covers three core aspects of inclusion: access, affordability, and digital ability which includes enthusiasm, confidence, and a sense of control when using the internet, as well as experience, skills, and knowledge in internet use.

Figure 2.4 – The digital divide in advantaged and disadvantaged communities



Sources: The Smith Family (2017), Thomson (2020), Thomson and Hillman (2019).

Issues arise with technology interoperability, privacy and security

The system and software requirements of schools depend on the size of the school, the social and economic demographic of the students, the availability of internet access, the age of students and the technical proficiency of educators within the school. Many schools, therefore, complement their centralised student information systems with commercial off-the-shelf products (PwC 2020).²⁵ This requires school staff and potentially teachers or principals to consider a range of factors including software integration (interoperability), privacy and security of data, and the efficacy of the product. However, teachers and principals may not always have the training, time or information to make these choices well.

A number of State and Territory governments provide support to schools purchasing software.²⁶ For example, the Victorian Department of Education provides guidance on privacy impact assessment. This process helps schools identify privacy and security risks, evaluate compliance with the *Victorian Privacy and Data Protection Act 2014* and *Health Records Act 2001*, and document what actions are required to mitigate any identified risk (Victorian Department of Education 2020). The Australian Government’s eSafety Commissioner provides online safety assessment tools and checklists to screen new technologies (eSafety Commissioner 2022). However, even with such supports, risks remain. Analysis of over 150 educational apps and websites found that close to 90% of those used could put children’s privacy at risk. These products

²⁵ A schools’ student information system is the central source of information. It holds information about a student — their name, contact details, medical information, and academic information. Some jurisdictions have mandated centrally delivered systems, while others allow the schools to choose (PwC 2020). Off-the-shelf packages can be used for a range of functions: channels of communication with parents; scheduling parent-teacher interviews; managing parent payments for tuition or excursions; canteen services and uniform shops; recording visitors to school premises; and, monitoring student attendance and results.

²⁶ The New South Wales Government has a centralised process for all information technology purchases (NSW Department of Education 2022).

requested access to students' contacts and locations, and monitored their keystrokes. Some of these products had undergone a privacy impact assessment (Duffy and Stewart 2022).

Support needed to implement digital technologies

There is limited information about how schools identify the need for digital technologies, understand the evidence about how these technologies are best used, and assess the relative costs and benefits of their deployment. Given the cost of some purchases, it is essential that school staff have the skills and capabilities to choose technologies that are fit for purpose, provide value for money, have the necessary safeguards, and are also beneficial for student learning, support teachers to teach or improve the operation of schools. If school staff lack this capability, they will need access to resources to help them.

While agreeing with the potential for digital technology to enhance education, AITSL noted:

Whatever technology is used, it is important that it supports effective teaching and learning. Teachers must have the capacity to shape how technology is used, and be provided with the time and professional learning they need to implement it. Evaluation should focus on the impact of any technology on student learning, and on how knowledge of impactful teaching has driven the use of technology (not the other way around). (sub. 146, p. 6)

To make these decisions, schools need to have access to information about the products available and be able to assess this information to make an informed decision. Evidence from other markets that sell complex products, such as financial products, suggests consumers can resort to decision-making processes that are less than ideal when the information available is complex and opaque, or pricing structures are difficult to compare (PC 2018, pp. 364–365, 373).

On that basis, there appears to be a role for government to provide a greater level of support — or one that is more coordinated — for school staff to ensure the most beneficial digital procurement decisions are pursued. AERO, or similar state- or territory-based organisations within each jurisdiction, should be responsible for researching and vetting off-the-shelf digital learning programs or formative assessment tools that meet desired criteria, such as effectiveness, usability (for students and teachers), privacy and risk considerations, and their complementarity to the national curriculum.

This would go some way to ensuring schools are not left on their own to navigate such decisions, and also assist in the diffusion of best practice programs and tools. However, such responsibility should not extend to mandating particular products, as some schools and jurisdictions may be well progressed on this front already. It is important that schools and jurisdictions retain autonomy to make their own digital procurement decisions, and having a body like AERO play a role in researching and vetting effective digital technologies would be of greatest benefit to schools that are under-resourced to perform this role themselves.

To support digital technology integration into the classroom, an ongoing commitment to teacher development is essential, especially considering the changing environment in which teachers are operating. The Grok Academy (sub. 185, p. 5) emphasises that digital skills matter to all jobs, and advanced digital skills take time to develop — priority should therefore be given to increasing digital skills development among educators instead of assuming that they have these already. In regard to spreading best teaching practice AITSL (sub. 146, p. 5) recommended funding a 'national online tool that allows teachers to find, manage, record and evaluate professional learning'. Such a tool could also help teachers develop and learn the best ways to leverage and apply digital technology in their classrooms. Similarly, teachers may need assistance to understand and integrate the results of technology-enabled student progress analysis into their teaching.

Enhanced professional learning modules for teachers, that better aid them in understanding how to use data collected digitally and apply this to their teaching practices could be developed. The New South Wales

Government has already identified this challenge as part of its Schools Digital Strategy (NSW Department of Education 2019, p. 20) with an actionable roadmap to address various challenges and opportunities that education technology brings, including teachers having the professional development and access to resources to apply digital technologies where appropriate to improve student outcomes.



Recommendation 8.1 **Leverage digital technology in schools**

State and Territory Governments should work with schools to extend, improve and embed the use of education technology in order to realise future benefits for students.

Initiatives should aim to:

- enable teaching practices to evolve with the changing classroom environment by prioritising the development and implementation of digital tools to support teaching and learning, while balancing flexibility for individual jurisdictions' needs – this could include developing an online assessment tool and giving the Australian Education Research Organisation (AERO) responsibility for researching and vetting effective digital technologies to be implemented in schools
- replace manual school administrative processes with technology-based and automated solutions where this has not been done already – this could include evaluating technology-based solutions for administrative processes currently in place and developing mechanisms to diffuse these to other schools
- support continuous commitment to ongoing professional development modules that support teachers in using data analytics to drive student improvement.

Making best practice teaching common practice

Drivers of effective teaching are varied and include factors that are affected by government policy (such as teacher salaries, the school environment, workload, classroom pedagogy, the national curriculum, and school management) as well as professional development in both initial and ongoing training. One way to support effective teaching is by building and supporting mechanisms that ensure evidence-based practice is used to drive better outcomes. But how best to convert knowledge about educational best practice into common practice is one of the main gaps in the process of diffusion (AERO 2021; OECD 2022c, p. 11; PC 2016, p. 29).

Some participants have called for government to have a greater understanding of classroom practice and pedagogical techniques (AERO 2022, p. 5; Grattan Institute 2022, p. 14). Having a greater understanding of classroom practice would help policy makers, school leaders, and teachers make informed decisions about the policies, programs and classroom practices that would lift student outcomes.²⁷

However, having an evidence base on its own will not ensure improvements in educational outcomes — effective practices must be employed by teachers in classrooms. Currently, there appears to be a substantial gap between high-level policy discourse, education research and classroom practice. Walsh et al. (2022, p. 7) found that teachers did not often use evidence-based research in practice. Instead, they indicated a stronger

²⁷ The creation of AERO in 2021, which seeks to provide an evidence base relevant to Australian schools, should, in time support informed decision making. The development of a strong evidence base is discussed more extensively in the Commission's Review of the NSRA (PC 2023, p. 189).

preference for professional information such as student data (77%) and professional observations (70%), compared with quantitative research (57%), qualitative research (48%) and randomised controlled trials (18%).

Not having a strong mechanism to convert education research into practice in the classroom lowers student outcomes, relative to what they could be, and has flow-on implications for productivity:

The price of this disconnect between education policy, research and practice has been high: Over the last few decades, education in most OECD countries has lost productivity, with teacher salaries having risen but outcomes not improved. (OECD 2022c, p. 3)

Education research needs to be salient and readily usable by practitioners

Making sure that evidence-based practices are successfully applied in the classroom is a deliberate and ongoing process.²⁸ AITSL submitted that translating evidence into the classroom is not as simple ‘as describing ‘best practice’ and expecting teachers to adopt it’ (sub. 146, p. 5). ‘Knowledge mobilisation’ (converting knowledge about best practice into common teaching practice) has moved away from a linear transmission, whereby evidence is developed (producers) and made available to the teachers and school leaders (users). Instead, it has moved toward a systems approach, which leverages relationships and engagement between all parties, and sees feedback loops and co-creation as central to knowledge creation and implementation (OECD 2022c, pp. 12, 20, 35–36).

At the school level, successful application of research relies on the ability of teachers, principals, and other school leaders to plan, implement, and evaluate change (Evidence for Learning 2019b, pp. 6–8). AITSL highlighted that the critical ingredients to success include: the skills of school leaders managing change; and, the skills of teachers in selecting and applying strategies that suit both their students and the content they are teaching (sub. 146, p. 5).

However, there can be barriers including a lack of time to access and engage with research. Research results can also be inaccessible and not readily translated to classroom activities. Added to this may be challenges posed by competing objectives, differing timelines, priorities, and prior views of researchers, policy makers, teachers, and principals. Facilitating greater diffusion of evidence-based research will therefore require coordination and leadership across multiple levels, skills and capabilities of key parties, effective communication channels, and well-placed accountability structures (OECD 2022c, p. 36).

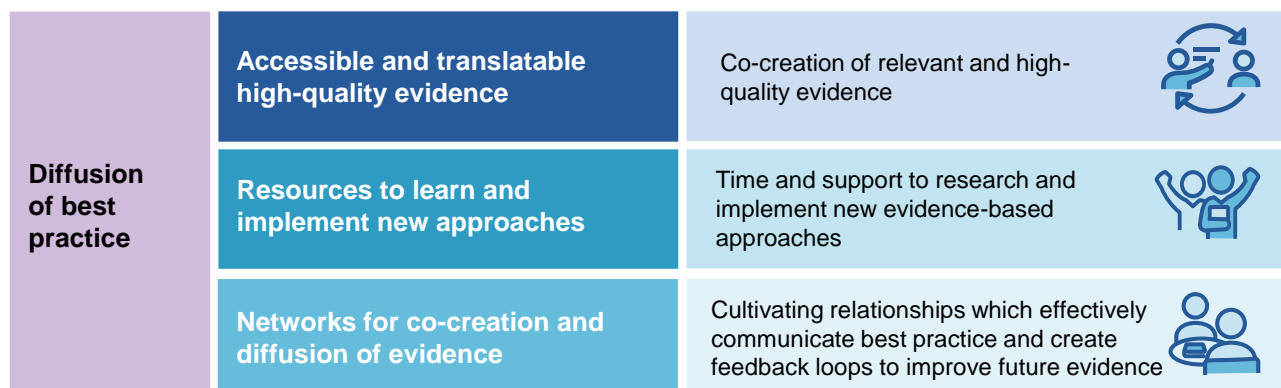
Efforts to promote evidence-based practice also need to be complemented by better information on what happens in classrooms. This will help policymakers: understand gaps between evidence and practice; monitor whether, and to what extent, particular evidence-based pedagogies and materials are being taken up; assess whether initiatives to promote best practice are working; and, understand barriers to the adoption of effective approaches (AERO 2022, p. 10; Sonnemann and Goss 2018, p. 16; Steiner, Magee and Jensen 2018, p. 15).²⁹

Teachers also need guidance to consistently integrate the most effective approaches into daily practice. Governments can play a role in facilitating better implementation of best practice by supporting better research production, which involves more co-creation and greater visibility of classroom activity, and improving initial and ongoing teacher training. Helping teachers access and implement evidenced practice also means acknowledging the demand on their limited time and the resources needed to fully engage with the research.

²⁸ The OECD (2022c, pp. 18–19) examines the models of knowledge transfer, the interplay of each organisation and mechanisms for successful adoption of evidence-based practices in the classroom.

²⁹ There are numerous ways to improve visibility of classroom practice, including teacher and student surveys and direct observation of classroom practice. All options carry costs and benefits (PC 2023, p. 200).

Figure 2.5 – Translating evidence and diffusing best practice



Observation and feedback is central to improving teacher practice

Cultivating effective teaching can look different for teachers at different points in their careers. At early career stages, especially in the first three to five years of work, teachers gain a lot of their knowledge from induction and mentoring. Ongoing professional development can help teachers at all stages access new evidence-based classroom practices or new ways to approach teaching using new technologies.

The process of sharing teacher expertise can take many forms, but a central element is observation and feedback. High performing school systems ‘cultivate an open door culture’ that ensures teachers have the time to observe others to develop their knowledge and expertise and to provide feedback (Jensen et al. 2016, p. 39). Teaching should be promoted as a collaborative endeavour, with performance improved through an ongoing process of constructive feedback (OECD 2018, pp. 115–116). Mentoring networks are particularly important for teachers and staff in schools experiencing disadvantage who often have more limited resources but more complex classroom environments (PC 2012, p. 278).

‘Highly Accomplished and Lead Teachers’ (HALTs), ‘Master Teachers’, and ‘Instructional Specialists’ are formal professional distinctions intended to recognise high-performing teachers. Employed by high-performing school systems overseas, such as in Singapore and Shanghai, Master Teachers are intended to be the pedagogical leaders in their subjects, working across a network of schools in their region to identify teacher needs, coordinate training, and connect schools with research (AERO 2022, p. 11). Unlike Master Teachers, who have no classroom load, Instructional Specialists split their time between classroom teaching and instructional leadership, working in their own schools to support and guide other teachers in specific subjects (Goss and Sonnemann 2020, p. 11).³⁰

Some Australian States and Territories also have their own specialist teaching roles. For example, in government schools in Victoria, Learning Specialists refer to highly skilled teachers that work with other teachers to improve their practice. In New South Wales, the ‘Best in Class’ Teaching Unit is made up of ‘handpicked’ teachers, chosen for being leaders and teaching experts in their respective fields. It is claimed that these teachers comprise the state’s best teachers who share their classrooms skills directly with those teachers and students who need it most (NSW Department of Education 2020).

³⁰ The *Australian Professional Standards for Teachers* recognise four professional levels and career stages: graduate teachers; proficient teachers; highly accomplished teachers; and lead teachers. Highly Accomplished and Lead Teachers (HALTs) are identified as ‘expert teachers and reflective practitioners who lead and support colleagues toward better outcomes for learners’.

But the uptake of such formalised teacher networks has been limited in Australia. Since the introduction of HALT certifications in 2012, only 1025 teachers have become certified; approximately 0.3% of the workforce (AITSL 2022, p. 14).

Reflecting the overall barriers to diffusion more generally, there are often limited instructional opportunities due to limited resources and constrained teacher time (Goss and Sonnemann 2020, p. 20; Willis et al. 2022, p. 35). A 2019 survey conducted by the Grattan Institute of 700 instructional leaders, teachers, and principals found that Australia's best teachers are often confined to their own classrooms, or stretched with 'add-on' instructional leadership responsibilities without adequate time, guidance or support to improve teaching in their school. They are rarely given access to an expert mentor, and were usually provided with no initial training in being an instructional leader (Goss and Sonnemann 2020, p. 10).

While emphasis is often placed on more formalised programs such as HALTs, teachers sharing expertise with others has also been identified as an effective form of learning and professional development (Grattan Institute 2022, p. 9; Hattie 2003, pp. 1–2; Ingvarson and Rowe 2008, p. 8). Less formal networks — where teachers work together in small groups to analyse and improve their practice — have been found to have significant positive effects on teaching quality and student academic achievement (TTRC, sub. 122, p. 3). Indeed, teachers are more likely to trust research shared by colleagues than from any other source (Walsh et al. 2022, p. 13). As informal networks do not require intensive application or certification processes, they can provide an accessible avenue for time-poor teachers to improve their practice (PC 2023, p. 187). Ochre Education observed that more support is needed to facilitate greater sharing of expertise and reach the 300 000 plus teachers in Australia (Ochre Education 2022, p. 4).

These various models are not mutually exclusive, and there is an opportunity more broadly to better support observation and feedback mechanisms within schools. In the recent review of the NSRA, the Productivity Commission recommended that State and Territory Governments include mechanisms for ensuring expert teachers can support colleagues to achieve better student outcomes through the dissemination of evidence-based practices (PC 2023, p. 188). Such initiatives would lift the quality of teaching in schools, improve student learning and over the long term, lead to a more productive economy.

Centralised curriculum support is a key mechanism to diffuse best practice

The process of spreading best practice can also be facilitated by dissemination of high quality curriculum-linked teaching materials. To implement the high-level achievement standards described in the Australian Curriculum, schools and teachers are typically left to their own devices to map out what to teach and how (box 2.3). Ochre Education observed that the Australian Curriculum is:

... a very broad and general framework to guide teaching of the subjects in the curriculum, including the standards at each grade level. This means that the work of delivering or enacting the curriculum on a daily basis is a significant task. Many teachers struggle to find the time, expertise, or resources to create excellent lessons each day. (Ochre Education 2022, p. 5)

Box 2.3 Achievement standards, curriculum, lesson plans

Australian curriculum – national standards

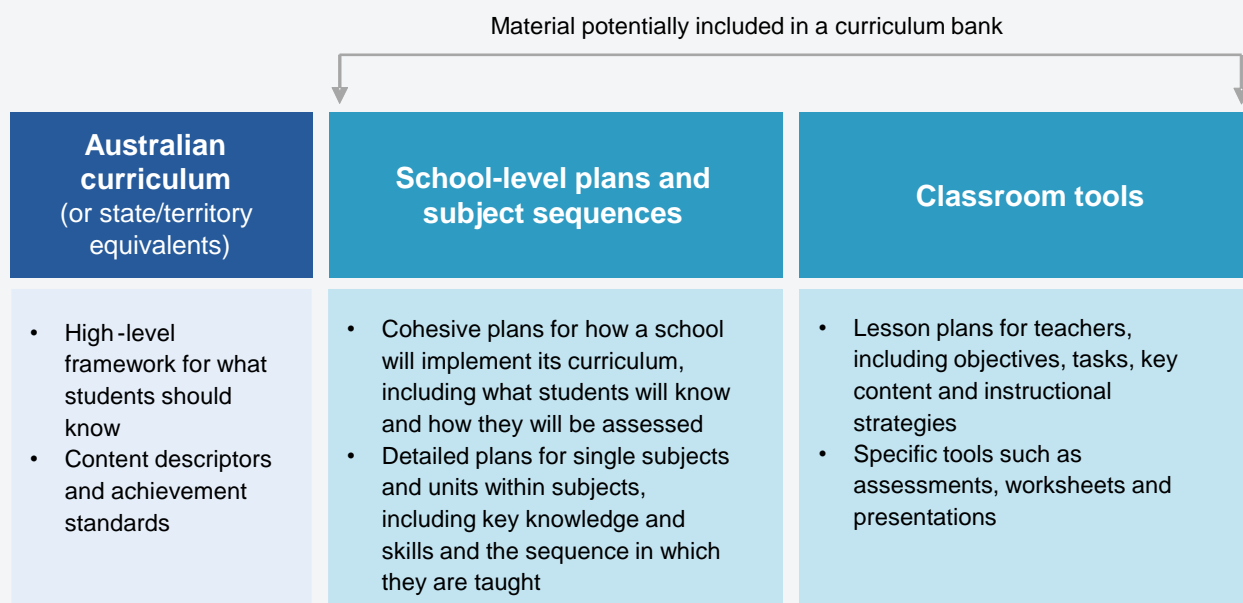
The Australian Curriculum sets consistent national standards to improve learning outcomes for all young Australians. It sets out, through content descriptions and achievement standards, what students should be taught and achieve as they progress through school (ACARA 2022b).

School curriculum planning

Schools develop a syllabus that outlines the means to achieve the goals and standards expressed in the Australian curriculum (or respective jurisdiction curriculum) across year levels and subject areas.

Schools also develop guidance to help teachers understand and apply what is in the national standards. For example, learning progressions, developmental continuums, scope and sequence documents, and unit goals and plans.

Teachers use instructional material to help students achieve the learning goals set out in the standards, such as textbooks, assignments, assessment tasks and scoring rubrics, computer programs, and lesson plans (Toon and Jensen 2017, p. 6). Lesson plans, one example of instructional materials, are a teacher’s detailed description of a lesson prepared before they start teaching. It covers what students will learn, how it will be taught and how teachers assess learning (NSW Department of Education 2021a).



Source: Figure adapted from Ochre Education (2022).

Individual teachers report spending hours preparing classroom lesson plans. While a central activity for teachers, most (86%) say that they do not have enough time for high-quality lesson planning — a view shared by both novice and experienced teachers (Hunter, Sonnemann and Joiner 2022, pp. 13–14).

While some degree of lesson planning is an important component of teacher’s work to enable tailoring to individual student needs, there are core aspects of planning for which it is inefficient to have every teacher undertaking the planning individually. Such an approach introduces variability in the quality of lesson plans from classroom to classroom or school to school, which can flow through to diversity in student outcomes.

The Grattan Institute found that ‘many students experience a curriculum that comprises a poorly connected series of activities, that can be highly repetitive or leave critical gaps’ (Hunter, Haywood and Parkinson 2022, p. 7). Many teachers use materials from private platforms that are difficult to quality-assure. For example, 64% reported using YouTube (Hunter, Haywood and Parkinson 2022, p. 31).

Even when self-produced lesson plans and classroom tools are individually of a high quality, ‘having teachers create their own lessons over time will rarely result in a fully sequenced, coherent learning experience for their students’ (Steiner, Magee and Jensen 2018, p. 14). Ochre Education observed that there were ‘significant gaps in much-needed detailed clarity, guidance, and support for teachers in planning and implementing the curriculum’ and this drove a lack of consistency and integrity in implementing the curriculum (Ochre Education 2022, p. 5).

High-quality curriculum guidance and instructional material could support the spread of evidence-based teaching practices in the classroom and reduce variability in the quality of lesson planning, and hence, outcomes for students. Providing teachers with classroom resources would also likely free up much of the time they spend planning lessons. Hunter, Haywood and Parkinson (2022, p. 34) found that the typical teacher surveyed (whose school provides them with a comprehensive bank of lesson plans for all subjects) spends three hours a week less on sourcing and creating classroom materials than the typical teacher whose school does not. This is in line with the experience of the UK’s Oak National Academy, whose bank of lesson plans improved the workload of just under half of users in the 2021-22 academic year, with a median saving of three hours per week (ImpactEd 2022, p. 4).

Saving this time would benefit students not just through quality teaching that is based on best practice resources, but also through enabling teachers to spend more time customising their teaching to their classes (Hunter, Haywood and Parkinson 2022, p. 32). The saving could be greater for those teachers who are teaching out of field, and need to spend more time to understand new content and prepare lesson plans (Mayer et al. 2015, p. 127). Further, the development of curriculum support could also be coordinated with better leveraging of technology to improve student outcomes.

Still, more than 40% of teachers reported their school does not have access to common, detailed lesson plans, unit plans, and assessments and a similar share said that their school has not established a detailed whole-school curriculum across subjects and year levels (Hunter, Sonnemann and Joiner 2022, p. 25). Just under half of all teachers are teaching in schools with no ‘school-based bank of instructional resources’ (Ochre Education 2022, p. 6).

Not surprisingly, high quality material can also positively affect student learning (Hunter, Haywood and Parkinson 2022, pp. 66–75; Steiner, Magee and Jensen 2018, p. 11). Improving teaching through better curriculum materials can have a positive effect on student academic achievement, especially when partnered with professional development programs for teachers. In a meta-analysis of international studies, Lynch et al. (2019) found that high-quality STEM instructional improvement programs (either curriculum sequences or professional development, or both) had an average effect of improving student test scores by 0.21 standard deviations. The most effective programs combined curriculum materials with professional development, and/or had particular characteristics such as offering teachers meetings to troubleshoot and discuss classroom implementation of the program (Lynch et al. 2019, p. 284). Similarly, the use of a particular high-quality mathematics curriculum in UK schools, along with professional development, was associated with the equivalent of one extra month of learning (Stokes et al. 2018).

The Australian Government is already pursuing some initiatives to assist teachers in spreading best practice through the provision or sharing of evidence-based teaching resources by funding the Digital Technologies Hub, Mathematics Hub and Literacy Hub, created by Education Services Australia. The hubs were developed over a number of years, in collaboration with the States and Territories and a range of teachers, academics and other subject matter experts to deliver a curated collection of resources aligned to the Australian Curriculum. Yet most teachers still spend many hours per week developing lesson plans with a large share reporting that available government-provided resources from their jurisdiction do not meet their needs (Hunter, Haywood and Parkinson 2022, p. 42).

Improved curriculum implementation support for teachers has the potential to diffuse best practice approaches in schools, reduce inefficiencies in use of teachers and improve the consistency of teaching and outcomes for students. Governments should work together to curate evidence-based curriculum resources and make them available for teachers and school leaders from a single source (PC 2023, pp. 41, 197).

Resources should:

- be curated by organisations with relevant curriculum expertise such as ACARA, AERO and/or Education Services Australia
- be independently quality assured based on what research says is most effective
- encompass whole-school curriculum plans, whole-subject sequences, lesson plans, and classroom tools
- use existing quality materials, including from the private sector, where possible
- be complemented with training in how to use the material.



Recommendation 8.2

Make best practice teaching common practice

State and Territory Governments should facilitate greater classroom access for the Australian Education Research Organisation (AERO) to support more principal and teacher involvement in education research to ensure that evidence-based research provides information that is salient and readily applicable by practitioners.

Initiatives should focus on:

- enabling greater observation of, and feedback on, classroom teaching practices, by supporting more informal teacher networks, and creating or strengthening the existing roles within the local school system for highly accomplished and lead teachers (HALT) to share their in-depth knowledge and skills with their colleagues
- increasing curriculum implementation support for teachers, by curating high-quality, evidence-based and government endorsed curriculum resources (curriculum plans, whole-subject sequences, lesson plans and classroom tools), to be made available for teachers and school leaders from a single source.

2.3 Shaking up how schools operate

The basic model of school operation in Australia, and many other developed countries, has changed little since it crystallised in the 19th and 20th centuries (with the exception of a gradually increased number of compulsory years) — with one teacher leading a class of 20 to 30 students between the hours of 9 am and 3 pm, with some minor variations across jurisdictions. Secondary schools are much the same but with different teachers instructing in each subject. The Australian Learning Lecture submitted that school is ‘stuck in the 1900s’ and ‘school systems want learners to do the same thing, at the same time, in the same way’ (sub. 124, p. 6).

While this traditional model of school has worked well for some students, that does not mean it is beneficial for all students, nor does it reflect the individualised nature of learning. Reforming school operation could therefore influence student outcomes, by offering learning options for students who are not thriving in the current system, particularly those who are not attending school or missing out on specific subjects.

Given the evidence that productivity growth in schools has typically lagged other sectors (section 2.1), there is value in ensuring it is possible to trial or implement new models (box 2.4), or adjust the existing model, including, for example through:

- digital delivery of lessons, to reduce out of field teaching
- delivery of lessons not based on age, to enhance individualised learning
- changes to school hours, to better suit student needs and preferences
- increased autonomy of schools to implement alternative, innovative operating models.

Box 2.4 – Trials can identify worthwhile programs when supported by quality evaluation

Trialling potential innovative approaches to learning offers an avenue for testing the targeting, design, implementation, and relative merits of alternative approaches before implementing them more broadly within the school system. In the context of the school system, innovations could cater to the local needs of particular types of students or communities.

Trials can give policymakers and the public valuable information about the potential benefits, implementation issues, and trade-offs involved in a proposed reform direction without having to incur the full cost of broadscale reform. They can also be terminated at a much lower cost than state-wide implementation if the expected benefits do not eventuate. However, trials should not be used as a tool by policy makers to simply postpone needed largescale reform.

Public schools are most likely to benefit from trialling alternative models of education as Catholic and Independent schools currently have more scope to explore different ways of teaching and more variations in their approach to education.

It is important that trials are properly evaluated to ensure intended objectives and outcomes are being achieved (and cost-effectively), with lessons incorporated into future policy making (PC 2020a).

Digital delivery of lessons to reduce out of field teaching

Teaching subjects that are beyond the field of a teacher's expertise is a perennial source of concern about lower quality education. Remote delivery of classes has the potential to reduce teaching out of field. While teaching out of field can reflect a shortage of teachers, it also reflects a mismatch of teachers across

schools.^{31, 32} There are teachers with a specialisation not teaching the subject in which they specialise, while in other parts of the school system, there are teachers teaching that subject out of field (figure 2.6).

Interestingly, the number of teachers who have specialised but are not currently teaching their specialisation (dark blue in figure 2.6) outweighs the number of teachers who are teaching that subject out of field (yellow in figure 2.6) (Weldon 2016, p. 4).

Using technology to deliver blended in-class and remote learning can help reduce the downsides associated with teaching out of field, including poor student outcomes, and additional teacher stress (PC 2012, pp. 95–96; Shah, Richardson and Watt 2020, pp. 9–10). Online portals and video technologies offer a way of ensuring access to qualified teachers, providing a viable alternative to either denying students access to subjects or using an unqualified teacher. Lessons could be pre-recorded or live, with pre-recorded lessons allowing schools timetabling flexibility. Students would still require school support while studying, including distributing resources and supervising assessments.

A similar schooling model is currently offered at Virtual School Victoria. While it is a model that caters for all subjects to be taught virtually, it also accommodates blended learning options — that is, where students want to maintain their current enrolment in their mainstream school, complete one or two subjects through Virtual School Victoria that are not offered at their school or not available due to timetabling clashes. Similarly, there are 7 state schools in Queensland that offer online education for isolated students throughout the state, providing a wider range of subjects to choose from, including languages.

An alternative approach involves interschool, video-based collaboration where students take classes at other local schools, attending lessons remotely. Once a term (or more frequently) the student could attend in-person for one-on-one tuition with the teacher.

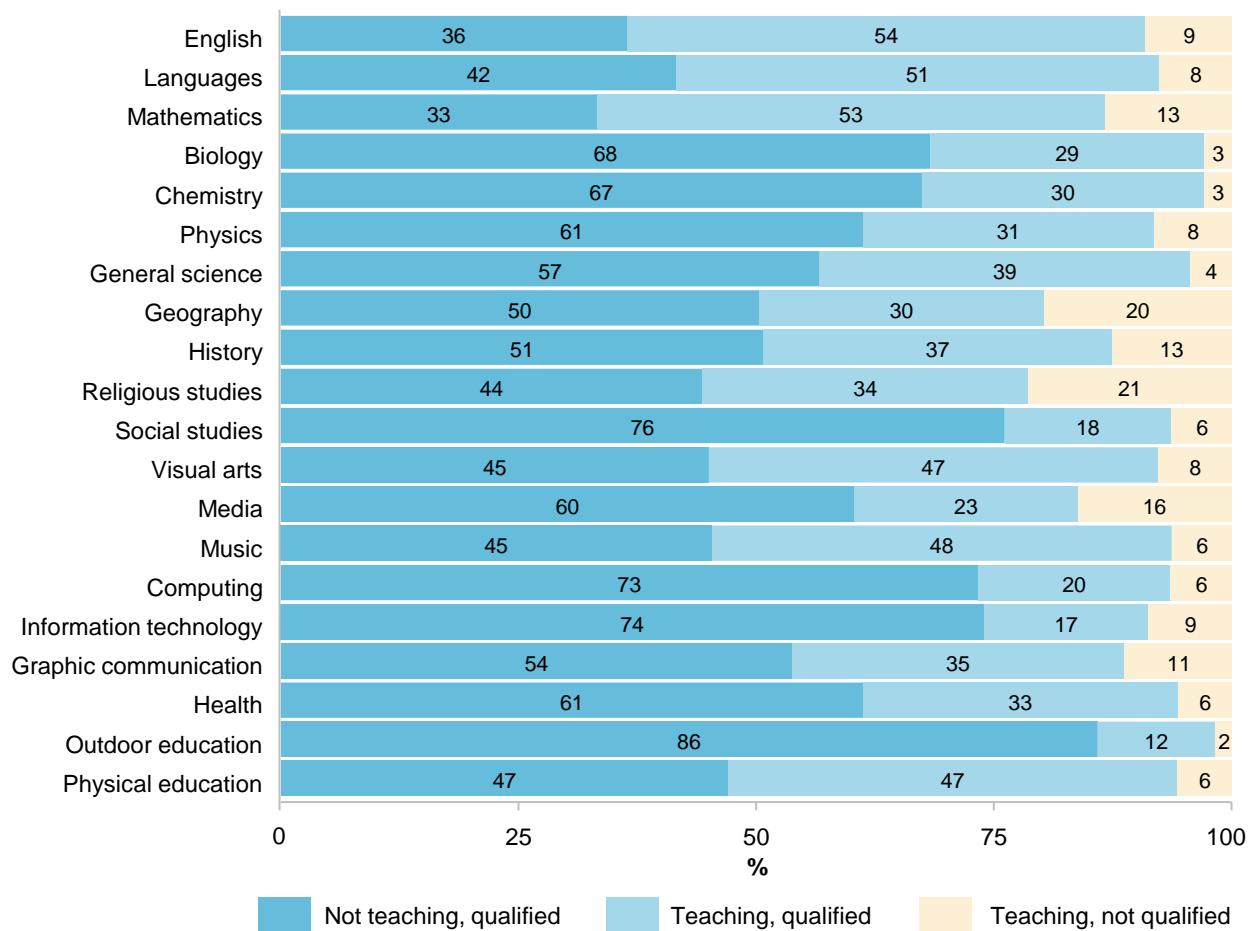
Some submissions to the inquiry provided broad support for remote delivery of class content to address out of field teaching (for example, Australian Investment Council, sub. 135, Australian Learning Lecture, sub. 124). AITSL (sub. 146) noted that the experience of teaching through the COVID-19 pandemic has provided a testing ground for more effective online lesson delivery, with various models adopted across schools. The Australian Learning Lecture observed that:

The most effective models of learning combined intensive synchronous learning, student focused asynchronous learning and an intentional focus on wellbeing and social connection. These models gave learners the agency and context to practise and develop the skillsets, mindsets and toolsets necessary to thrive now and into the future. (sub. 124, p. 5)

³¹ Teaching out of field is often attributed to a shortage of teachers in that field, with policy responses that aim to increase the supply of teachers. There are also broad-based solutions to attract more people to teaching generally, including raising the profile of teaching as a valued occupation and providing a greater career pay progression. Other strategies target support to those teaching out of field by providing a mentor or experienced in-field teacher to observe their classroom practices. The Commission's Review of the National School Reform Agreement has a detailed discussion of the rates of teaching out of field (PC 2023, pp. 205–225).

³² The mismatch is caused by the complexities of school class scheduling, autonomy and funding of teacher deployment, and the nature of student-teacher ratio funding making it difficult for some schools, particularly small schools, to have the right mix of teachers to cover the full spectrum of classes demanded for secondary school students (Hobbs and Porsch 2021, p. 1).

Figure 2.6 – Qualified but not teaching that subject while others are teaching out of field
Percentage of secondary teachers either teaching or qualified to teach, by subject



Source: Weldon (2016).

Delivery of lessons based on progress, not age

The ability of students to progress through their education, and absorb and benefit from more advanced learning, will differ substantially between students. However, the way that students progress through various year levels is a feature of school operation that appears to have changed very little over time. Students are generally grouped by age, and progress through school together with their age cohort (Masters 2022, p. 13). This approach is taken despite the increasing emphasis that is placed on individualised learning — students are broadly taught the same curriculum at the same time and given the same opportunities to master the content before being assessed and moved on.

The downside of the conventional approach is that low-achieving students often lack the skills necessary to progress, and fall further and further behind, confirming their lack of mastery and increasing their likelihood of disengagement. At the same time, high-achieving students who are ready to progress to more challenging and advanced material can be held back.

An alternative approach that sees learning as a continuous process that is flexible to the needs and proficiencies of individual students is the use of ‘untimed syllabuses’, as suggested in a recent review of the

NSW curriculum (NESA 2020). This restructures the curriculum as a sequence of levels that students progress through at their own pace:

The underlying principle is that learning is maximised when learners are presented with appropriately challenging material, rather than being under-challenged by what they already know or over-challenged by what they are not yet ready to learn. (NESA 2020, p. xv)

Schools would still be organised in year groups, with students in each year group made up of students working at different levels. In practice, this would likely involve a highly personalised approach to learning that would be reliant on effective use of digital technologies (Deunk et al. 2018; Li and Wong 2021).

While teachers regularly differentiate teaching within classes as a strategy to maximise student learning, there is no current evidence supporting the implementation of untimed or differentiated curricula at a system level (Wilson 2021). At a school level, differentiation may lead to small to moderate student improvements in student performance when it is implemented as part of a program of broader school reform including appropriate teacher training and implementation of technology (Deunk et al. 2018).

In an ongoing quest to improve student outcomes, it may be worth trialling untimed syllabuses in Australian schools to shore up the skills of lower-achieving students and extend the capacity of those at the higher end.

Adjust school hours to better suit student needs and preferences

The current school hours have been broadly in operation for many years — set at a time where society's norms, knowledge, and economy were very different. A variety of reasons have been put forward as to why current school hours may not be appropriate — particularly for student learning and parents' labour force participation.³³ The focus in this report is on whether adjusting school hours would alter student outcomes, while acknowledging that there could be other labour market participation and productivity impacts.

State and Territory Governments are responsible for setting school hours. While all jurisdictions allow individual schools to determine specific times based on local factors, the usual school day is about 6 to 7 hours (8:30-9:00 am to 3:00-3:30 pm).³⁴ Despite this autonomy, school changes to start and finish times generally appear to be minor — within 15 minutes to half an hour of the usual time. This can be to accommodate local bus timetabling, for example.

Most schools making more substantial changes to start and finish times are secondary schools, although this also occurs at other levels. For example, one primary school, Merrylands East Public School, operates from 8:00 am to 1:15 pm, with playground supervision from 7:30 am. It has a recess break and no lunch break but offers the same amount of teaching time as public schools. Internationally, there is considerable variation in school hours. At a national level, some countries have longer school hours than the Australian standard day, with Hong Kong, Taiwan and South Korea, averaging between 7.5 and 8.5 hours a day (NCEE 2018). In other countries, decisions about school hours are made at a local level. Academies in the UK, for example, were established to provide greater autonomy, which could include increasing school hours if they think their students would benefit (Hutchings and Francis 2018, p. 8).

Some have proposed extending the school day to broaden the range of subjects and activities students could explore (Strahle 2016). For example, it could allow students to explore hands-on science, engineering, music or arts. The New South Wales Government is trialling extended operating hours with a focus on

³³ The primary purpose of schooling is teaching and learning. Students being supervised is a by-product of the time spent at school learning, although supervision is more relevant for younger primary school children than older students, particularly high school students. Nevertheless, students attending school allows for parents and carers to work.

³⁴ Independent and Catholic schools set their own start and finish times, but these are broadly similar to public schools.

broadening the activities in which students participate and supporting parental participation in the workforce (White 2022). For some schools and some topics, the current after-school hours care model could offer a basis for integration of a broader range of activity opportunities.

Others have proposed longer school hours to support learning, particularly for those that are falling behind learning benchmarks. This has garnered interest in recent years with disrupted and lost learning opportunities due to COVID-19 (Kim and Ashbury 2021; Weale 2021). Owing to the cumulative nature of learning, students that have missed learning foundational concepts will struggle to keep up. The United Nations agency, the Accelerated Education Working Group, recommends extending teaching time as an appropriate strategy when pupils have missed out on up to one year of education (AEWG 2021, p. 6,19). Schools could use the additional hours of instructional time to provide extra support to students struggling in specific subjects.

However, matching resources with students' needs and making optimal use of that time and other resources are central to realising a student's learning potential (OECD 2021b, p. 330). The decision to lengthen the school day needs to take into account the costs and benefits.

Further, the benefits of longer school days are contingent on what happens during the longer hours — whether that be improved learning or exposure to cocurricular activities that are more efficiently and equitably provided at school. Extending hours may also reduce stress on harried parents trying to balance work and their children's needs, increasing parental labour force participation rates and potentially reducing the need for after-school hours homework. However, if managed badly, none of these benefits are likely to materialise. The Australian Learning Lecture suggested that rather than extending hours, classroom time could be reduced instead:

In addressing the productivity issue, we need to reconsider the curriculum and cut compulsory face-to-face learning hours for students, to enable teachers to design more personalised and responsive student learning, and give students more control over their learning and deepen their learning. Teachers also need time to reskill for our changing world. (sub. 124, p. 7)

Whatever their benefits, alternative school timing options would need to be traded off against the associated implications for salary costs of teachers and other staff, and the value for children of time spent on other activities outside of the school environment.

Increasing autonomy of schools to adapt to local needs

Rethinking approaches to schooling that are not working in certain cases may justify a more fundamental change to the school model, as has been observed in Australia (for example the Nawardekken Academy in West Arnhem Land, box 2.5), and overseas (for example, charter schools in the US, and academies in the UK, box 2.6). The Australian Investment Council recommended fast-tracking the establishment of dedicated STEAM (Science, Technology, Engineering, the Arts and Mathematics) schools, another example of innovation in the school model (sub. 135, p. 4).

State-funded autonomous schools may provide opportunities to innovate in education services, particularly where the standard model of schooling is not flourishing. Part of the rationale for increased autonomy is that it should provide increased opportunity for innovation in the delivery of education services. In urban areas, autonomous schools may also provide competitive pressures that inspire improvement in government-run schools, although there is limited evidence for this (Gill 2016).

Academies and similar autonomous schools aim to improve the results of disadvantaged students they serve. While evidence is mixed, they have largely been able to at least match the performance of the national average (Hatton and Drake 2019; Worth 2016). However, they appear to benefit certain cohorts of students more than others and it is difficult to find evidence that is applicable to all academies and charter school students while having confidence in the direction of causation. It is also unclear what drives the improved performance of academies.

Box 2.5 – Nawarddeken Academy as an example of innovation

Nawarddeken Academy is an Independent primary school that provides full-time education from teachers and Aboriginal elders. In 2015, the Kabulwarnamyo campus, based in an outstation in west Arnhem land with a population of just over 50 people, was established using a grant from the Karrkad Kanjdji Trust and Gunbalanya School (Vivian 2022). It was not until 2019 that it was able to register as an Independent school making it eligible for recurrent funding from the Australian Government (Nawarddeken Academy 2020). In 2022, two further campuses at Manmoyi and Mamadawerre were established (Vivian 2022).

The genesis of Narwaddeken Academy lies in an Indigenous ranger program established in part by recognised artist, Elder and traditional knowledge holder, Bardayal ‘Lofty’ Nadjamerrek OAM. Indigenous rangers sought education for their children to be delivered on country so that they would not have to leave their children with family in larger towns.

‘Country as classroom’

The school uses a ‘both ways’ approach that emphasises ‘respect, and the ability to integrate customary modes of learning guided by our old people with a ‘western’ educational curriculum’ (Nawarddeken Academy 2020, p. 7). In doing this, the Academy seeks to, among other things:

- empower young people to be strong and confident in western and Indigenous knowledge systems
- preserve Nawarddeken languages and culture through bilingual and bicultural experiential learning.

Nawarddeken Academy uses a curriculum based on the concept of ‘country as classroom’ which links people’s desire for environmental and social outcomes on their own land with an alternate school education that works for their children. The unique curriculum is based on:

[O]ur land, language and culture, using formal and informal teaching and learning approaches; emphasising mental and physical health, while cultivating individual and collective respect and responsibility. (Nawarddeken Academy 2020)

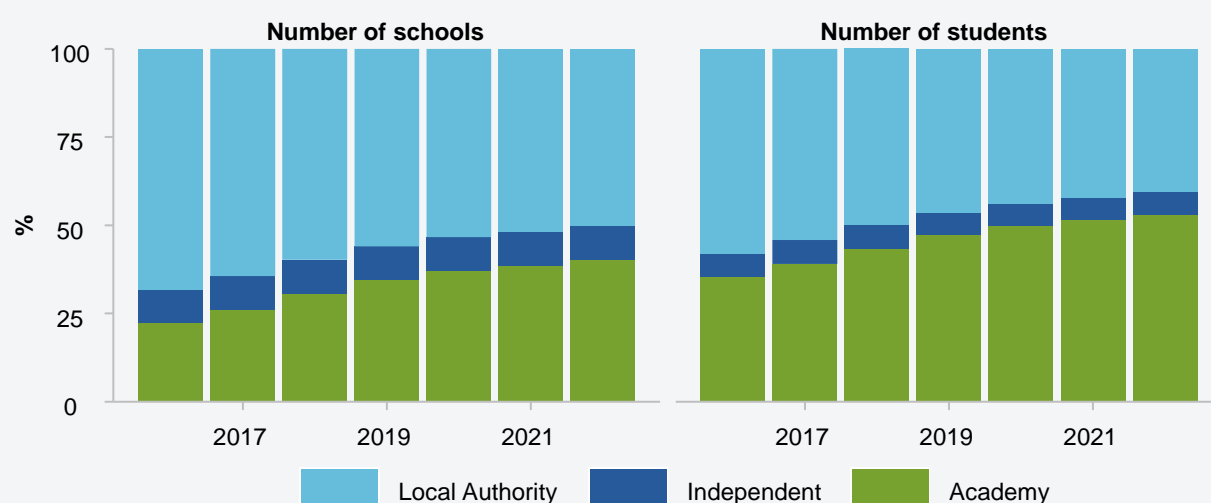
This approach simultaneously recognises that ‘education that is not connected to the reality of a student’s life will fail’ (Fogarty 2012), and the ‘importance of country in the social and economic fabric of everyday life in remote communities’ (Fogarty and Schwab 2013, p. 13). Implementation of this approach saw attendance rates of between 78 and 93% over the four school terms in 2020 (Nawarddeken Academy 2020), and increased student engagement (Masters 2021). By comparison, the student attendance rate for years 1-10 was 53.7% for Aboriginal and Torres Strait Islander students in very remote areas of the Northern Territory in 2019 (SCRGSP 2022).

Box 2.6 – Academies and charter schools allow for different approaches in schooling

English academies

The academy program started in 2002, and over two decades has become the predominant model of secondary school in England, making up about 80% of secondary schools, and educating about 79% of secondary students (National Statistics (UK) 2022). Overall, 40% of all schools are now academies, with more than half of English students (53%) now attending an academy (figure) (National Statistics (UK) 2022).

The charter school sector in England continues to grow^a



a. Figure contains data for both primary and secondary schools and students.

Source: National Statistics (UK) (2022).

Academies have typically replaced poor-performing secondary schools located in areas with concentrated social disadvantage. An ‘academy trust’ administers the school and has the autonomy to vary ‘curriculum, school year, staff pay and conditions of service’ (Hutchings and Francis 2018, p. 8). They are independent, non-selective in their student intake and state-funded, and are generally sponsored by philanthropists or business partners seeking to improve local education.

Charter schools in the United States

The degree of autonomy accorded to charter schools varies by state, but they are typically unable to be selective in their student intake and unable to charge fees for schooling (Epple, Romano and Zimmer 2015, p. 2). Where there is an excess of demand for charter school services, students are typically chosen through a lottery process. Since 2009, the proportion of all public schools that were charter schools has increased from 5% to 8%, making up about 7500 schools across the United States.

Despite not legally being allowed to be selective in their student intake, charter schools are not necessarily representative of the general population. Compared with the national average, they tend to be: more ethnically and racially diverse, with higher shares of Hispanic and African-American students; lower proportions of students that speak English; and, lower proportions of students with special needs.

Advocates highlight the increased ability of autonomous schools to meet the unique circumstances and needs of the community in which they operate, while detractors tend to attribute success to the practice of academies becoming more selective in their student intake (and barring students who would otherwise bring down results). Submissions to the inquiry did not shed further light on the evidence for or against autonomous schools, such as charter or academy models. These models represent just two examples that have arisen from giving schools increased autonomy to adapt to local needs.

There may be some benefit in trialling state-funded but privately administered schools as an alternative when public schools are not meeting the needs of their local community or the needs of a particular cohort of children — indeed, this is what has already been done with the establishment of the Nawardekken Academy.

Moving forward, State and Territory governments should ensure there are no barriers to experimenting with alternative, new and innovative school models, where there is a justification to suggest a particular model could improve student outcomes. The Productivity Commission is not advocating a particular model — given the lack of evidence suggesting that one approach is more favourable to others if applied in an Australian context — but rather supports a policy environment that encourages experimentation and new innovations designed specific to local needs, preferences, and objectives.



Recommendation 8.3

Enable experimentation with alternative approaches to schooling

State and Territory Governments should be open to experimenting with new, innovative school models or operational changes where there is an evidence base (including overseas) to suggest outcomes could be improved for Australian students.

In the first instance, legislative, regulatory, administrative or policy barriers that would prevent individual schools varying their operating model should be removed. In addition, there should be capacity and appropriate resourcing within the local school system to allow the merits of any trials to be evaluated.

Innovations should aim to:

- offer different lesson delivery options to lift quality teaching and learning, including for example, offering online classes in the absence of a teacher with the relevant expertise in a topic, or trials of untimed syllabus approaches to promote a continuous learning process
- better cater to student needs to encourage school attendance and lift student outcomes, including through variations in school hours and use of technology to personalise students' learning environment.

3. Investing for future skill needs

Key points

- * **Rationing places in tertiary education — through skill lists or provider funding caps — impedes efficient skill acquisition by limiting access or distorting course choice. Concerns about fiscal costs are better addressed through other means, such as changes to subsidies or expanding income-contingent loans.**
- * **The Australian Government should return to demand-driven funding for Commonwealth supported places for domestic undergraduate university students.**
 - Demand-driven funding would allow the sector to better support workforce needs, facilitate competition, and avoid perverse incentives to enrol students in courses that do not align with skill needs.
 - Reaping the benefits of a demand-driven system will hinge on measures to contain fiscal costs and ensure all students are adequately supported to complete their studies, or if appropriate, to ‘fail fast’.
- * **Subsidy allocations need to be recalibrated to improve efficiency and equity.**
 - Currently, governments set subsidies based on targeting public benefits and skill needs, but these have little impact on student choice and many students receive large subsidies despite large private benefits.
 - Instead, student contributions should be set based on average expected earnings for each field of study, with more of the costs paid by those that benefit from study rather than the broader tax base. The government subsidy should cover the gap between the student contribution and estimated cost of delivery.
- * **Unlike students, providers are highly responsive to course prices. Setting prices to better reflect course delivery costs would encourage providers to meet skill needs and dampen incentives to prioritise enrolments in high margin courses.**
- * **Expanding loan access for vocational education and training (VET) students would reduce barriers to participation, but would need to manage the risks of abuse seen under VET FEE-HELP.**
 - All Diploma and Advanced Diploma courses should be eligible for VET Student Loans, except those primarily taken for leisure or with poor labour market outcomes. Following an evaluation, expansion to Certificate IV and Certificate III qualifications should be considered.
- * **Labour market trends suggest a growing need for upskilling and reskilling given changes in the nature of work and structural shifts in the economy, particularly the rising importance of digital, dynamic, and service oriented skills. Policies supporting learning later in life should be consolidated to avoid overlaps and gaps, and to target barriers to uptake.**

Investment in tertiary education — primarily provided by government directly or through loan programs and student contributions — is critical to developing the skills of Australia’s workforce (chapter 1). This chapter explores whether current settings are well-designed to support the sector’s growing importance in meeting labour market needs and driving Australia’s long-term productivity. While the tertiary sector has generally performed well against key metrics (chapter 1), there are significant opportunities for improvement.

Australia’s tertiary system is bifurcated, with vocational and higher education funded, regulated, and delivered separately and provision continuing to overlap. Governments use broadly similar levers across both sectors to influence investment, but these are implemented in distinct ways (table 3.1).

Table 3.1 – Differences in regulating, funding and financing VET and higher education

How govts ...	Vocational education and training	Higher education
Regulate the sector	<ul style="list-style-type: none"> Primarily S & T government responsibility Most qualifications at AQF 1-6^a Admission to individual provider, or through employer for apprenticeship pathways ASQA^b responsible for regulating national minimum standards and compliance with the VET Quality Framework S & T governments regulate quality standards of funded providers through contracts Mostly competency-based assessment. 	<ul style="list-style-type: none"> Primarily Australian Government responsibility Most qualifications at AQF 5-10 Applications for admission centralised for the majority of school leavers TEQSA responsible for regulating national minimum standards Some providers (mostly universities) self-accredit qualification content, and TEQSA regulates materials for most non-universities Proficiency-based assessment.
Regulate places	<ul style="list-style-type: none"> S & T governments manage demand through a ‘skills list’ of courses eligible for subsidies, but also cap subsidised places for certain courses or registered training organisations (RTOs). 	<ul style="list-style-type: none"> Places not directly set but constrained by the maximum basic grant amount. Universities can enrol more students but do not receive a government contribution after reaching the maximum basic grant amount.^c
Set course prices	<ul style="list-style-type: none"> Prices not regulated in most jurisdictions, but some set maximum or minimum prices. 	<ul style="list-style-type: none"> Maximum prices for undergraduate courses set based on median cost of delivery.
Set subsidies	<ul style="list-style-type: none"> Government subsidy varies based on skill shortages and economic or social returns. 	<ul style="list-style-type: none"> Government subsidy varies based on national priorities and estimated employment prospects.
Allocate funding	<ul style="list-style-type: none"> Subsidised providers contracted by the relevant S & T Government. 	<ul style="list-style-type: none"> Subsidised providers block funded through Commonwealth Grant Scheme (CGS).
Offer loans	<ul style="list-style-type: none"> Australian Government administers VET Student Loans and Trade Support Loans Loans available for Diploma and above, only for certain courses with industry need. Full fee-paying students incur a 20% loan fee. 	<ul style="list-style-type: none"> Australian Government administers Higher Education Loan Program (HELP) Loans available to all domestic students, some full-fee-paying students incur a 20% loan fee.
Fund other programs	<ul style="list-style-type: none"> Governments fund apprenticeship support, as well as employer assistance for apprentices. 	<ul style="list-style-type: none"> Contingent funding for equity groups through the Higher Education Participation and Partnerships Program (HEPPP).

a. Australian Qualifications Framework. **b.** ASQA regulates about 90% of RTOs, including those operating across jurisdictions or delivering training to international students. RTOs delivering training only to local students in Victoria and Western Australia are regulated by state-based bodies (the Victorian Registration and Qualifications Authority and the Western Australian Training Accreditation Council). **c.** Demand-driven funding applies to Aboriginal and Torres Strait Islander students who live in regional and remote Australia.

Participants noted the stark differences in arrangements between the sectors. Expressed bluntly:

... Australia's tertiary education space is a dog's breakfast. It's as if VET comes from Mars and higher education from Venus. ... We have a qualification classification that separates VET and higher education. We have two regulatory bodies, with quite different ways of operating. We have funding arrangements which reflect history rather than logic. We have fee and loan arrangements which are all over the place. (Tom Karmel, Sub. 197, p 5)

If one were starting from a blank slate, the tertiary education sector would almost certainly be designed more cohesively. However, the practical reality is that the VET and higher education sectors have evolved in vastly different ways over time. In large part this is because State and Territory governments play the dominant role in VET, while the Australian Government is the principal funder and regulator of higher education.

In this historical context, steps toward greater consistency should not be taken arbitrarily and need to have expected benefits that justify the costs and disruptions associated with any change. For example, while some have called for a single tertiary sector regulator, ASQA and TEQSA (the VET and higher education regulators) largely oversee separate markets with different types of institutions and risks. The greatest gains are likely to be achieved by streamlining regulation for dual sector operators (as advocated by IHEA, sub. 120, pp. 8–9).

Another key priority is the reforms to the Australian Qualifications Framework (AQF) recommended in the Noonan review. These reforms were also supported by the Bean-Dawkins *Review of University-Industry Collaboration in Teaching and Learning* and several submissions to this inquiry (for example, AiGroup, sub. 179, p. 6). Reforming the AQF would go some way in breaking down barriers and improving pathways between the sectors; as well as recognising the growing importance of microcredentials and the increasing need for generalised capabilities in the workplace. The Productivity Commission has not considered the AQF in detail as part of this inquiry, but encourages continued momentum in reforming the AQF.³⁵

For this chapter, the Productivity Commission has focused on government investment (figure 3.1). Investment has a pervasive influence on the operation of providers, the choices of students, the outcomes within Australia's tertiary system, and therefore labour market and social outcomes more generally. As these issues often manifest in similar ways across sectors, each section considers both VET and higher education. However, given the recent review of the National Agreement on Skills and Workforce Development proposed many reforms to VET funding, there is more focus on higher education in the recommendations in sections 3.1-3.3. Still, section 3.4 recommends greater harmony in loan settings between the VET and higher education sector.³⁶ Finally, section 3.5 considers the role of government support in fostering a culture of lifelong learning, covering both sectors.







Although international students play an important role in the tertiary education sector and the Australian economy, they are not a focus of this chapter, which considers access to tertiary education for domestic students. While international students have a bearing on productivity if they transition into the skilled

³⁵ Implementation has been slow, in part, as it requires agreement between Australian, State and Territory governments; and across school, VET, and higher education sectors. A cross-jurisdictional working group has been established to develop and provide advice to Skills and Education Ministers about addressing AQF Review recommendations, with advice expected in 2023 (pers. comm. Department of Education, December 2022).

³⁶ This is consistent with the views of many participants in this inquiry, who cited access to financing as the most salient discrepancy in policy settings between the sectors, with implications for student choice.

migration intake, most (84%) do not stay in Australia long-term after studying (Treasury and Department of Home Affairs 2018, p. 21).³⁷

Figure 3.1 – Investing for future skill needs

Section 3.1	Expanding tertiary places	 Uncapping places to meet skill needs
Section 3.2	Recalibrating funding	 Student contribution  Gov't contribution
Section 3.3	Setting cost-reflective prices	 Provider revenue per student
Section 3.4	Increasing loan access	 Income-contingent loans for more students
Section 3.5	Supporting lifelong learning	 Targeted government support

3.1 Meeting demand for a more educated workforce

Education improves productivity and brings broader benefits to the Australian community (chapter 1).

However, government investment in education needs to be efficient — it is not just the aggregate level that influences productivity and public benefits, but also how it is spent and targeted. Subsidies and loans that differ across courses and sectors (VET and higher education) may influence choices about whether and where to study. Appropriate funding settings can encourage students to pursue education with long-term individual and societal benefits. But poorly targeted funding can lead to students studying courses that are a poor fit, resulting in lower completion rates, lifetime earnings, and productivity growth.

The public benefits from investing in education are sizeable, but there is also an opportunity cost — investment in supporting students must be funded by taxpayers and, like other government investments, funding can always be used elsewhere.³⁸ As such, there is a finite capacity for public investment in tertiary education.

Saying this, policies should allow equally able students to attend regardless of their background and financial situation.³⁹ Educational attainment is often determined by factors other than innate ability or potential public and personal gains. Health, familial responsibility, financial situation and other circumstances can limit students with high potential. Continuing support for such students is essential for an equitable system.

³⁷ Pathways to permanent residency are discussed further in this inquiry's companion volume '*A more productive labour market*'.

³⁸ Additional investment in education requires either raising funds through taxes — which have distributional impacts and can distort economic activity (for example, income taxes reduce labour market participation) — or reducing funding from other government services and payments, such as healthcare, transport, or welfare payments.

³⁹ The quality dimension of the student experience also becomes increasingly important to outcomes as the student body becomes more diverse (chapter 4).

Due to the finite capacity of governments to subsidise tertiary education, all governments use mechanisms to limit financial outlays. Many State and Territory governments partly or fully cap funded places available in their training programs (PC 2020c, pp. 454–468), and the Australian Government limits the total funding available for each university, which effectively acts as a cap on places (DESE 2021c).⁴⁰

Demand for tertiary-educated workers continues to grow, meaning pressure on government budgets or students missing out

The growth in Australia’s educational attainment — with over half of 25-34-year-olds now holding a tertiary qualification — has contributed to productivity growth (chapter 1). But despite record participation, demand for tertiary-educated workers is still growing as Australian businesses require new skills to operate in an increasingly digital and service-oriented economy. This suggests that the tertiary sector will need to ensure that it has capacity to provide up to date initial qualifications and support upskilling and reskilling. A more educated workforce will also position Australia to better take advantage of worldwide skill-biased technological change, as a more attractive location for businesses employing highly skilled workers.

Further, there are demographic pressures on the sector, which are insufficiently factored into planned funding growth.⁴¹ The population of post-school students will grow, with an expected 15% increase in the number of 19-year-olds in the decade to 2030 (chapter 1). This growth means governments will either have to accept a smaller proportion of young people attending tertiary education, spend significantly more, or alter funding structures to allow more places to be delivered for the same fiscal cost.

Forecasts of jobs growth for university-qualified roles exceed the forecast growth of additional university places by a factor of 8:1 by 2026.⁴² However, this is not a like-with-like comparison, as the forecast growth in jobs includes all workers with a bachelor’s degree or higher, not just new graduates. This gap might otherwise be met through students supported under current funding arrangements, skilled migration programs, and through better allocation of skilled workers. Nonetheless, current settings mean the tertiary sector will not adequately support future skill needs and productivity growth.

From an economy-wide perspective, short-term fiscal constraints alone are not a strong rationale for limiting places in tertiary education. Limiting places reduces long-term human capital development, productivity growth and the economic opportunities of some — for the short-term benefit of the taxpayer.⁴³

⁴⁰ Places in Medicine are specifically capped by the Australian Government, but restrictions on full-fee domestic undergraduate places, combined with the maximum funding amounts for universities can effectively constrain places each year (DESE 2021c).

⁴¹ This point was also made by many participants in this inquiry — both those in the sector and employer groups (AEU, sub. 21; NTEU, sub. 36; ACCI; sub. 47; Master Builders Australia, sub. 58; Universities Australia, sub. 70; Regional Universities Network, sub. 154; Group of 8, sub. 187; Science and Technology Australia, sub. 188). On this basis, some advocated a return to demand-driven university funding (Australian Investment Council, sub. 135).

⁴² Commission estimate based on NSC (2022b) and Warburton (2021, p. 6). The number of university places is not set directly, rather the Australian Government sets a maximum basic grant amount for each university. Actual places depend on course enrolments, given the different Commonwealth contribution levels by field of study.

⁴³ Notwithstanding, there remain good reasons for careful management of education and training programs from a fiscal perspective. This has been demonstrated by the experience of budget blowouts and subsequent cuts under recent policy experiments, posing risks to the quality of education and the life outcomes of students. These issues can occur even in more constrained programs, as recently occurred with the ACT’s Skilled Capital training initiative (Jervis-Bardy 2020).

Lessons from past expansions need to be heeded

Several recent government policies have changed tertiary education access settings. The ‘demand-driven’ university system between 2010 and 2017⁴⁴ resulted in a place for every domestic undergraduate student that universities decided to enrol (PC 2019, p. 19). This significantly increased university participation, from 53% to 60% between 2010 and 2016 (PC 2019b, p. 49) but funding caps were reintroduced due to budget concerns — discussed further below.

Similarly, the national entitlement to training implemented in the VET sector meant each jurisdiction implemented their own version of an ‘entitlement’ to a Certificate III or above.⁴⁵ The most expansive and ‘demand-driven’ was the Victorian Training Guarantee. This policy was successful in significantly expanding access and providing greater choice of qualifications for students, but also led to major budget and quality concerns, resulting in the recapping of course places, and major funding cuts to VET in Victoria (Hetherington and Rust 2013). Other States and Territories implementing the training entitlement also had significant increases in enrolments, such as South Australia’s Skills for All (ACIL Allen Consulting 2015), but subsequent programs in other jurisdictions were more tightly constrained (PC 2020c, p. 148).

Budget blowouts occurred under these policies, threatening their political viability and prompting governments to search for savings elsewhere in the system. This sometimes involved reductions in the amount providers received for each student, with risks to the quality of education.

Fiscal costs do need to be controlled, but this can be better achieved by recalibrating subsidy and loan settings so that more of the costs are borne by students rather than reducing overall funding below the level that is needed to deliver a high-quality education. If done well, this can equitably share the costs of expanding access to education without deterring potential students from study or distorting student choice within or between VET and higher education (section 3.2, section 3.4).

Sustainably expanding places requires careful consideration of the balance of places and other policy settings across VET and higher education. For example, the introduction of the demand-driven system in universities coincided with a decline in VET enrolments, although the complex factors affecting enrolments in each are difficult to disentangle. To the extent that VET and higher education are substitutable pathways for some students, expanded access should be considered with reference to both sectors to avoid shifting students from one sector to another due to policy settings rather than students’ capabilities and interests. This is challenging given the separate determination of funding allocations between VET and higher education — with differing Australian, State and Territory government responsibilities.

The barriers to educational attainment and the paths to improve investment also differ across the university and VET sectors. In higher education, caps on places are largely determined by government investment with limited scope for domestic students to undertake fee-for-service undergraduate study at public universities.⁴⁶

⁴⁴ The demand-driven system involved a 5% increase in the cap on student numbers in 2010 and 2011. Places were then fully uncapped from 2012 to 2017 for almost all fields of study. Funding was frozen in 2018 (PC 2019, p. 5).

⁴⁵ The national training entitlement was agreed to by the Council of Australian Governments in 2012 as part of the renegotiation of the *National Agreement on Skills and Workforce Development* and the *National Partnership Agreement on Skills Reform*. Under this agreement, State and Territory governments committed to establishing or expanding existing training programs to improve VET access and affordability. As part of this, the Australian Government also expanded VET FEE-HELP to provide ICLs for Diploma and above courses, which was subsequently wound back and abandoned due to escalating costs and rorting (PC 2020a, p. 84-85).

⁴⁶ Undergraduate domestic full-fee places are only available to students who are not eligible for a Commonwealth supported place, for example, an Australian Citizen who is living overseas while studying, or international students who were granted permanent residency during their course of study (The University of Melbourne nd; The University of New England nd). In 2020, about 0.8% of total domestic student places were fee-paying bachelor’s degrees (Universities Australia 2022).

In VET, where students can pursue fee-for-service training (and fee-for-service enrolments outweigh government-funded enrolments), limited loan eligibility may be the main constraint on demand.

Increasing access to vocational and higher education simultaneously, including through expanding loan access to more VET courses (section 3.4), would help prevent any ‘residualisation’ of VET that may have occurred under the demand-driven system. This would be complemented by reforms that have been initiated to improve the quality and relevance of the VET system (chapter 4).

Funding places to meet demand brings clear benefits

Expanding places in line with demand has three key benefits.

- Additional students experience considerable employment and income benefits from attending tertiary education, and this is particularly so in the context of an imminent spike in school leavers and continuing growth in jobs requiring tertiary qualifications.
- The current approach to public funding of universities stymies competition, while a demand-driven system allows greater flexibility for funding to follow the student.
- The current approach also creates an incentive for providers to enrol students in certain courses that may not align with skill needs, which can be eliminated in a demand-driven system.

Each of these is discussed in turn below.

Greater access to tertiary education will benefit students and productivity

Tertiary education comes with significant costs, including government subsidies and students’ time, debt, and forgone earnings. In most cases, the benefits to students and society exceed these costs (chapter 1). But expanding access is only worthwhile if this holds true for those students who would not otherwise have enrolled (‘additional’ students).

Demand-driven university funding (in place until 2017) attracted many such additional students — with the share of young people attending university by age 22 years increasing from 53% in 2010 to an estimated 60% in 2016 (PC 2019b, p. 49). The Productivity Commission analysed the performance of these additional students, comparing their performance to that of ‘other’ students who would have attended university without the policy. Most additional students seemed to see significant benefits from the demand-driven system.

When comparing outcomes against other students, additional students did perform worse on some dimensions, with a significantly higher proportion dropping out — 22% rather than 12%. However, these additional students faced more hurdles, for example being more likely to have a lower SES background, be the first in their family to attend university, and have a lower Australian Tertiary Admissions Rank (ATAR).

Given these challenges, additional students performed quite well. By age 25 years, they were equally as likely to be in full-time employment as their more advantaged counterparts, and most had found managerial or professional employment.⁴⁷ Earnings differences were modest (PC 2019, p. 7).

The most relevant question is not whether outcomes for additional students are worse than those of the average student — this is to be expected. Rather it is whether the additional students would have been better off pursuing other pathways, such as VET, and whether the costs of their participation outweighed the overall benefits. This is more challenging to answer, and the Productivity Commission was not able to do so conclusively with available data. However, it is reasonable to infer the investment would have paid off for many given the high proportion of additional students who found highly-skilled work, and the fact that earnings grow by a much greater extent over

⁴⁷ Overall, including those who tried university and dropped out.

the career of higher-skilled workers (chapter 1). The demand-driven system also helped a larger share of young people, particularly disadvantaged students, to acquire skills that were valuable to the Australian economy.

This is further supported by international analyses that more directly estimate the benefits of higher education for 'marginal' students.⁴⁸ These studies generally find that returns to university attendance for marginal students are similar to or greater than returns to other students (box 3.1) — results that, to the extent they are generalisable to Australia, imply the benefits of expanding access are well in excess of the costs.⁴⁹

Dropout rates for marginal students are the greatest concern. However, it is difficult to determine from the outset which students are likely to succeed, and, for many, there can still be some benefits from partial completion of studies, even if it is not the optimal outcome (chapter 4). Policy reforms have the potential to reduce the costs of attrition through better support and quality teaching or, if dropping out seems highly likely, facilitating 'failing fast' (chapter 4).

In the short term, given the upcoming growth in the university-age population, most additional students are likely to be quite similar to many current students in terms of academic preparedness. In the medium term, expanded access is likely to include a broader base of additional students.

Box 3.1 – The returns to education are high for students at the margin of attendance

The magnitude of the total social returns from 'marginal' students depends on their lifetime outcomes from participation in higher education compared with an unobserved counterfactual. This is different from the comparison of marginal students with those who would have attended anyway. For example, a marginal student with lower innate ability may well obtain a lower lifetime income than other students, but also have a greater lifetime income than they would have had they not attended (for example, because they would have been employed in a precarious low-paid low-skill job).

International evidence provides estimates of the effect of higher education for marginal students using various natural experiments (although which students are 'marginal' will differ depending on the context and empirical approach). These studies, in effect, allow comparisons between students who are identical in every respect, except that some have attended university and some have not. This research generally finds that benefits for marginal students are similar (and sometimes higher) than for other students (Deming 2022).

For example, gaining attendance to the worst-ranked public university in Florida increased marginal students' earnings by 22% (Zimmerman 2014). Marginal students at 4-year universities in China saw attendance increase their earnings by 40-60% (Fan et al. 2010). Gaining admission to 4-year colleges in South Korea increased hourly wages by about 68% (Kim 2021). In these studies students who were not admitted typically attended other tertiary institutions — which may differ from VET institutions in Australia.

Other studies use natural experiments resulting from funding, financing, or dismissal policies to focus on the effect of university completion, rather than attendance. These studies also find substantial earnings benefits for students who would not be able to complete their studies but for these policies (Bettinger et al. 2019; Black et al. 2020; Chu and Cuffe 2021; Denning, Marx and Turner 2019; Ost, Pan and Webber 2018).

⁴⁸ Marginal students are on the margin of attending — those who attend university but would not if access were slightly narrower, and those who do not attend but would if access were slightly broader. This cohort will differ in each context.

⁴⁹ Noting the empirical evidence suggests that signalling explains, at most, a modest share of the returns to education (chapter 1).

One risk of an unconstrained system is that it could encourage ‘overskilling’ or ‘overeducation’ — additional education that may be unnecessary and merely a form of credentialism.⁵⁰ However, if and where this is occurring, it is unclear how much this is being driven by tertiary education policy (and concerns over credentialism typically relate to post-bachelor education, which is not directly affected by demand-driven funding). Other culprits could include increasing regulatory barriers to entry in certain professions and labour market conditions.

Funding allocation may inhibit competition

Across both VET and higher education, funding is often capped and allocated to providers based on historical grant allocations, rather than contestable arrangements.

- In VET, TAFEs receive significant block funding in some jurisdictions, but a lack of transparency on funding arrangements (and a lack of comparability across jurisdictions) makes this difficult to estimate.
- In higher education, the majority of funding for teaching is allocated through grants under the Commonwealth Grants Scheme, equivalent to \$7.7 billion in 2020, or 42% of total Australian Government financial assistance (DESE 2021a).⁵¹ Under the Commonwealth Grants Scheme, a university holds a funding agreement with the Australian Government, with a maximum basic grant amount (MBGA) set for each year based on the funding for student places the university received at the end of the demand-driven system in 2017.⁵²

The impacts on competition vary across the tertiary sector.

In the VET sector, although many students do not receive government funding, those that do tend to study at TAFE (figure 3.2). As a result, a small number of providers receive the majority of government funding. Despite this distribution of funding, there is a reasonable degree of competition within VET, with 87% of students having a choice of registered training organisation (RTO), 30% of students studying in highly competitive markets and 20% in moderately competitive markets (PC 2020a, p. 94). This reflects the emphasis since the 1990s on reforms to increase competition between RTOs. Indeed, about 4000 RTOs service VET markets, compared with the 194 higher education providers delivering qualifications (TEQSA 2022c).⁵³ However, there is scope to increase the role of contestable funding given that some jurisdictions still prioritise public providers (PC 2020a, pp. 290–294).

⁵⁰ Concerns regarding the poorer labour market experience of recent graduates might point to issues with overskilling, given evidence of higher rates of underemployment, lower average incomes and less employment in high-status occupations, compared with previous graduates (de Fontenay et al. 2020; PC 2020d). However, falling *average* labour market outcomes of graduates do not imply that the marginal student would not benefit from attending education. Rather this points to the importance of macroeconomic stabilisation policies.

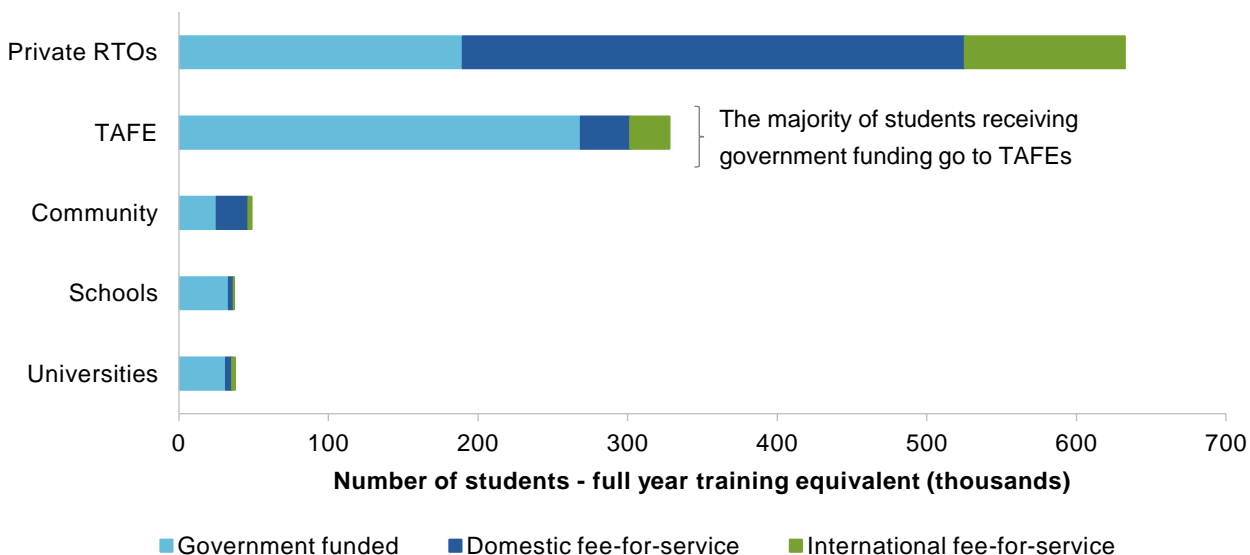
⁵¹ An additional \$6.1 billion of assistance is provided to universities through loan schemes, equivalent to a further 33%. While the loan component is somewhat ‘activity-based’ (albeit constrained by universities’ maximum grant amount) and the majority is ultimately paid by the student, the total value of the CGS and loan contributions account for over 75% of total government assistance provided to universities (including government funding for research).

⁵² 7.5% of CGS funding is also intended to be performance-based, discussed further in chapter 4.

⁵³ Based on the national register of vocational education and training (training.gov.au) as at January 2023.

Figure 3.2 – Private RTOs deliver more VET, but the majority of government-funded students attend TAFEs^a

VET program student enrolments, by funding type

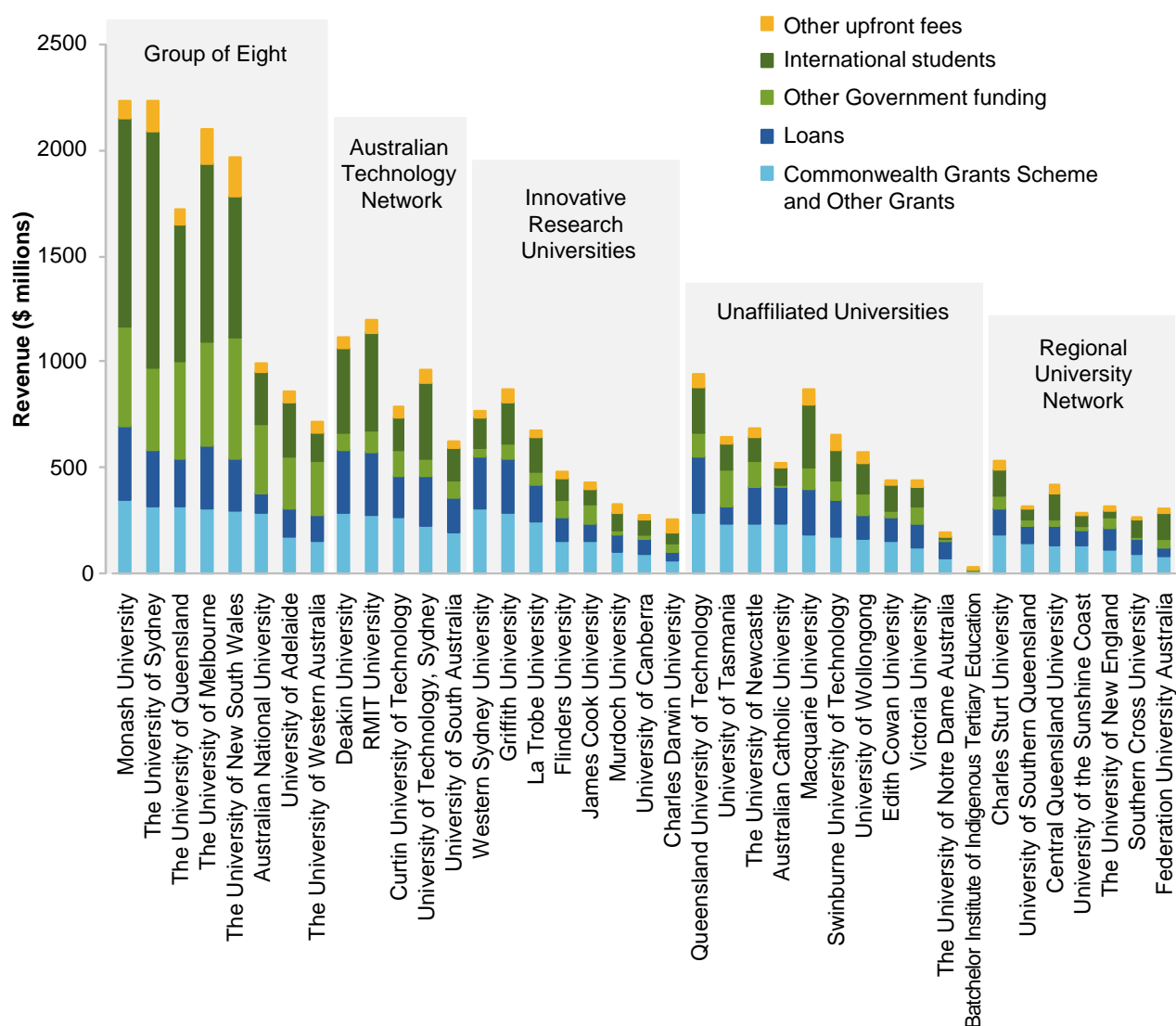


a. For government-funded students, the amount of subsidy provided for each course varies by State or Territory, depending on the specific subsidy program in each jurisdiction.

Source: NCVET (2022c) VOCSTATS — Total VET Activity data.

In the university sector, the spread of funding allocated through the Commonwealth Grants Scheme across the 37 public universities appears more evenly distributed than in VET (figure 3.3). But the spread of *total* funding is more concentrated after accounting for research funding and revenue from international students. Given the powerful branding of research-intensive universities, this may further entrench incumbency. And unlike VET where there is a broad diversity of providers in the fee-for-service market, non-university higher education providers service less than 10% of full-time domestic enrolments (DESE 2022d).

Figure 3.3 – A small number of large universities
Total university revenue by source, 2020



Source: DESE Higher Education Finance Statistics (2021a).

Unlike VET subsidy programs, funding is not contestable between providers in the higher education sector. While allocating funding based on historical arrangements provides certainty for governments and providers, it can also limit competition. There is little incentive for higher education providers to innovate, improve their quality (chapter 4), or differentiate their offering from others, and little opportunity for new providers to enter the market. Block funding also prevents the sector from adjusting to changes in demographics or skill needs.

The impact of this lack of contestability is worsened when supply is capped at a level far below demand both at the system-wide and provider level — as will likely be the case in coming years when the population of school leavers is expected to increase by about 15%. Accordingly, providers may be able to maintain their student intake even if their teaching quality is mediocre. In this way, funding caps undermine the financial incentive for high quality teaching. The floor to quality is only reached if TEQSA steps in or if the quality of education is so low that some students opt out of higher education altogether.

In contrast, in a system where the money follows the student, providers' ability to receive this funding hinges on their ability to attract students. Notwithstanding that many factors aside from teaching quality influence students' choices, removing caps on funding creates an incentive for providers to provide a high-quality education. Indeed, inquiry participants attending the Productivity Commission's roundtable on tertiary education reported the previous demand-driven system created an impetus to focus on the quality of the student experience, as students were more able to leave and go to an alternative provider if they were dissatisfied.

The extent to which a demand-driven system increases contestability is partly a function of which providers can participate in it. Previously, it was only accessible to public universities.⁵⁴ Other options are to include not-for-profit universities, all universities, or all higher education providers. There may be some benefit from the position put by Independent Higher Education Australia that Commonwealth supported places should be extended to all higher education students in national priority fields delivered by any TEQSA registered provider (IHEA, sub. 120, p. 5). The more expansive the scheme, the more contestability will increase, particularly if the smaller but more numerous and geographically dispersed non-university providers are included. However, a more expansive scheme will need to be weighed against the costs and risks of including new types of providers.

Cross-subsidisation would be a concern if Commonwealth supported places are available at private providers. It is difficult to reliably estimate course costs for universities, and costs vary significantly by university (section 3.3). If other providers receive the same level of subsidy as universities, it is likely that this will exceed their costs — leading to subsidies going directly to profits and risking entry of unscrupulous providers into the market. Accordingly, there are significant risks if subsidies are provided on the same basis as they are currently, and it should not occur without measures to ensure they are appropriate given potential differences in delivery costs. Even then, fiscal costs would likely rise as more students pursue higher education, and further analysis is needed to determine if the students brought in by this change would experience similarly positive outcomes to those brought in by the expansion of university places.

Caps on funding distort providers' incentives

While the intent of recent university funding reforms was to encourage students to take courses linked to skill needs and 'national priorities', the reforms had the unintended consequence of creating an incentive for universities to enrol students in some courses that the reforms intended to discourage, particularly at the margin.⁵⁵ The government contribution was set with reference to priority skills. However, universities respond to the total funding level (including both the government contribution and student contribution).

Universities cannot receive more government funding than their MBGA, but different students contribute different amounts toward this cap based on the government subsidy for their course. This means that if a university has \$30 000 left in its MBGA, the university could either offer a place to one agriculture student, or to 27 humanities, commerce or law students based on the regulated pricing structure. Accounting for the student contribution, the former would result in about \$31 000 in total revenue, yet the latter would result in about \$425 000 in revenue (based on 2022 rates) (Department of Education 2022c).

This creates a strong incentive for providers to channel students into the cheaper 'chalk and talk' subjects like commerce, humanities, and law, and away from the more expensive fields such as agriculture, engineering,

⁵⁴ Technically, Table A universities (*Higher Education Support Act 2003* 30-1(1)(a)(i)).

⁵⁵ Each university's block funding amount was based on the number of student places offered at the conclusion of the demand-driven system. While this determines the maximum funding envelope, it does not specify any course or student mix. This means that universities can choose which students to enrol, with funding provided based on the fee structure (the sum of the government and student contribution) set by the Australian Government for each field of study (Ferguson 2021a).

and science. This is a significant distortion that would prevent some students from studying courses to which they are best suited, where they may be the most productive, and where skill needs are greatest.

This is exacerbated by universities' ability to 'over-enrol' students — taking on more students than can be covered by their MBGA (although in doing this they must forego these students' government contribution). This can still be profitable if the student contribution alone is greater than the cost of supporting these additional students, which will only be the case for select courses, such as the cheaper subjects mentioned above. For the expensive and/or low student contribution courses such as engineering, nursing, or teaching, over-enrolment would likely have to come at great cost.

These perverse incentives could be ameliorated by reducing the drastic differentials in student contributions established by the Job-Ready Graduates package (section 3.2), but this would not remove this issue entirely. Even under a flat student contribution, when nearing a cap more students could be enrolled in cheaper courses than more expensive courses, for a greater total amount received by the university.⁵⁶ When exceeding a cap, over-enrolment still could make financial sense for cheap courses.

Ultimately, perverse incentives result from any capped system and cannot be fully avoided without removing the cap itself.⁵⁷

The way forward

Given growing skill needs, the significant productivity benefits for marginal students, and the perverse incentives and constraints on competition imposed by caps, the Australian Government should revert to a demand-driven system for university funding. Without such a system, many students — disproportionately those facing disadvantage — who would have their lives enriched and be made more productive by higher education will be denied this opportunity.

If fully demand-driven funding is not implemented, at the least, MBGAs should increase annually, with the growth rate adequately accounting for the cost associated with the growing population of school leavers.⁵⁸ Although this would be an improvement on current arrangements, it would mean retaining existing pitfalls, including inhibited competition and perverse provider incentives at the margins. This would sacrifice many of the benefits to productivity that could be achieved by a return to demand-driven funding.

Other recommendations in this volume will also need to be implemented to ensure a demand-driven approach works effectively. In particular:

- the costs of expanding access can be contained by increasing the proportion of course costs paid by students (recommendation 8.5). Depending on the size of this increase, the transition to a demand-driven system could be budget neutral

⁵⁶ Assuming a flat \$10 000 student contribution, a university with \$30 000 left in its MBGA would be able to enrol 1.4 agriculture students or 5.2 humanities, commerce, or law students. The former would result in \$44 000 in total revenue, yet the latter would result in \$82 000 — a lesser distortion than under Job-Ready Graduates, but still a potentially damaging one.

⁵⁷ That said, it is possible to cap the number of places rather than the quantum of funding. This would remove any incentive issues resulting from cost differentials. However, this presents its own problems by creating significant budget uncertainty — for example, the cost of supporting 10 000 places could be anywhere from \$11 million to \$272 million depending on what students choose to study (based on current funding structures at 2022 rates).

⁵⁸ Under current settings, MBGAs will grow by 1% for low-growth metropolitan, 2.5% for high-growth metropolitan and 3.5% for regional universities (DESE 2021c). Even the highest of these growth rates may be insufficient to meet the demand from the expanding school leaver population. And these growth rates will not be fully phased in until 2024. Additionally, MBGAs are indexed using outdated forecasts of inflation, reducing the number of places that will be able to be supplied. If a capped system is retained, this will need to be addressed (Norton 2022, p. 33-35).

- prices should be based on the cost of delivery with estimates refined over time (recommendation 8.6)
- higher education will not be the most suitable pathway for all students. Providing access to VET qualifications on a more equal basis — as well as being beneficial in its own right — will limit the expansion of higher education coming at the expense of VET (recommendation 8.7)
- the quality of education for additional students under the previous demand-driven system was sufficient for them to experience reasonable outcomes, and demand-driven funding improves incentives for quality teaching. However, as the diversity of students grows and as the resources flowing into higher education rise, there remains a strong need to improve quality and support completion (through the recommendations in chapter 4)
- it will be of increased importance to ensure more school leavers possess the necessary foundational skills to succeed in further study (through the recommendations in chapter 2).

Government funding alone is not sufficient for places to be supported in many courses. Inquiry participants indicated that providers are constrained by a lack of placements for courses such as nursing and allied health, which limits the number of places that can be offered (sub. 153, sub. 154, sub. 182, sub. 184). Where placements are required for graduates to work in their field of study, governments should ensure an adequate number are available and funded to meet skill needs.⁵⁹

There could be phased implementation of a demand-driven system if it appears that universities would expand places rapidly before they can adjust resourcing to cater effectively to larger cohorts. This may not be necessary if demand for university places is reduced by strong labour market conditions, as has been the case recently.



Recommendation 8.4

Grow access to higher education over time

The Australian Government should adopt an improved demand-driven model for providing Commonwealth supported places to domestic undergraduate university students, subject to measures outlined in other recommendations that: contain fiscal costs (recommendation 8.5); and ensure all students are adequately supported (recommendations 8.13 and 8.14).

3.2 Improving governments' subsidy allocations

Governments use a range of inter-related controls to influence investment in tertiary education, which in turn affects human capital and skills acquisition. Typically, governments:

- set limits on the availability of subsidised student places (discussed above)
- set maximum prices (course fees), or maximum loan amounts
- subsidise course costs based on a determined government contribution and/or student contribution
- offer student loan programs to improve education access and affordability

⁵⁹ Another issue is medical places, which under the previous demand-driven system was the one course to have a designated funding level. Expanded access to medical places may be warranted given the shortages of doctors in many geographical areas and areas of practice. However, this would require further consultation.

- offer other funding programs and incentives, for example to support capital investment or equity group participation.⁶⁰

Governments' investments in tertiary education aim to support equity of access and efficient skill acquisition to meet labour market needs. However, the suite of subsidies, funding allocations and prices set by governments can undermine these goals (table 3.2).

Table 3.2 – Incentive problems affect the efficacy of government investment

	Investment levers	Incentive problem	Recommendation(s)
Subsidy setting	<ul style="list-style-type: none"> • Subsidies set to encourage students into courses that align with skill needs. 	<ul style="list-style-type: none"> • Subsidies to influence student choice are ineffective and inequitable. 	<ul style="list-style-type: none"> • Student contributions should be set more equitably, based on private benefits. (section 3.2)
Price setting	<ul style="list-style-type: none"> • Prices and loan caps set to incentivise efficient service delivery, limit market power and support fiscal sustainability. 	<ul style="list-style-type: none"> • Provider incentives to enrol in high margin courses, rather than meeting labour market demand. 	<ul style="list-style-type: none"> • Improve estimation of costs of provision. (section 3.3) • Using estimated costs, set annual prices (and loan caps) to approximate the median efficient cost of delivery. (section 3.3)
Financing	<ul style="list-style-type: none"> • Financing is available to most higher education students, unlike VET students. 	<ul style="list-style-type: none"> • Policies may distort student choice based on financing availability rather than where skill acquisition may be the most efficient or desirable. 	<ul style="list-style-type: none"> • Loans should gradually be made available to more VET students, starting with expanding eligibility for courses at a Diploma or above level. (section 3.4)

Setting government subsidies

Governments have used various (and changing) subsidy models to influence student incentives (box 3.2). The range of models used historically — coupled with the lack of consensus amongst stakeholders — calls into question the approach that would best support efficient skill acquisition. The more recent model has been a partial subsidy that differs by course type, combined with an income-contingent loan (ICL) available to almost all higher education and some Diploma students. ICLs also have an implicit subsidy as many students do not fully repay their loan (section 3.4).

The Productivity Commission proposes that subsidies be greater, on average, and set in line with the private benefits of different degrees — with higher student contributions for high-earning degrees such as medicine. Requiring a larger student contribution for high-earning degrees is both equitable (as those students receive greater benefits, on average) and efficient (as it frees up more funding to expand access to higher education). Income-contingent loans prevent any serious adverse consequences for an individual who undertakes a high-earning degree but has poor outcomes.

⁶⁰ Loan and subsidy arrangements vary across the sector. University undergraduate degrees receive a Commonwealth supported place, and have the costs of their education subsidised by the Australian Government, with the remainder of the cost deferred through an income-contingent, interest-free loan (HECS-HELP). University students that do not receive a Commonwealth supported place — for example, those undertaking a master's degree — are also often eligible for another income-contingent loan, FEE-HELP. Conversely, many VET students are not eligible for an income-contingent loan (section 3.4).

Box 3.2– Governments use different models for subsidy setting

Different principles have informed subsidy determination at different times. At the extreme ends of the spectrum, a student may be:

- **fee-for-service (full private cost)** — the full cost is paid by the student. This is the case for students who do not receive a government-funded place, including international students, some postgraduate students, and non-university undergraduate students as well as students undertaking many VET qualifications not on skill lists, or those not eligible for a subsidised place
- **fully funded (full public cost)** — the full cost is incurred publicly, as occurred in 1974 when tuition fees were abolished. However, demand pressures and a growing fiscal burden led to the introduction of fees through the Higher Education Contribution Scheme (HECS) (PC 2019b, p. 20). More recently, some governments have offered ‘Free TAFE’ programs, but only for students at public providers — a policy that undermines the viability and competitive role of private providers (PC 2020a, p. 97).

However, most courses have some combination of a subsidy and private contribution (either an up-front fee or a loan). To determine how large each contribution should be, governments usually consider:

- **private benefits** — there are significant private benefits to tertiary attainment (chapter 1).
- **public benefits** — in principle, without subsidies that reflect the social benefit of education, there could be underinvestment as individuals only account for the private costs and benefits of study.
- **skills shortages or labour market needs** — all governments use skill lists to differentially allocate subsidies, with higher subsidies applied for apprenticeships in particular. The Australian Government’s Job-Ready Graduates package also revised subsidies to encourage demand for courses deemed to meet skill needs.

Governments fund courses based on public benefits and skill needs ...

Subsidy setting policies across VET and higher education aim to encourage uptake of training that is socially desirable or in demand in the labour market — primarily through higher subsidy rates for select courses. In VET, governments subsidise qualifications with differential rates depending on whether the qualification is a deemed priority (PC 2020a, p. 256).⁶¹ In higher education, the 2020 Job-Ready Graduates package also altered government subsidies to better align with ‘industry and community priority’ (box 3.3).

⁶¹ Jurisdictions usually use a combination of quantitative and qualitative labour market analysis (including industry forecasts, mapping qualifications to occupations, industry consultation and labour market testing) to make a judgement on the qualifications demanded in the labour market, and therefore, the extent of subsidy. Typically, governments target subsidies to the areas deemed to have high returns, either to the public (such as foundation skills courses) or to the individual (such as apprenticeships). Subsidies can also differ depending on whether a student studies at a public or private provider, the level of the qualification, and the mode of study (e.g. apprenticeships). However, there is limited transparency regarding how these criteria influence subsidy setting.

Box 3.3 – How did Job-Ready Graduates alter subsidies for university courses?

The 2020 Job-Ready Graduates package (JRG) altered the student and government contribution to courses in different fields of study. Subsidies were increased for certain fields deemed to produce more ‘job-ready’ graduates and decreased for fields where graduates were deemed less employable. These changes were partly aimed at improving matching of students to skill needs and therefore, productivity:

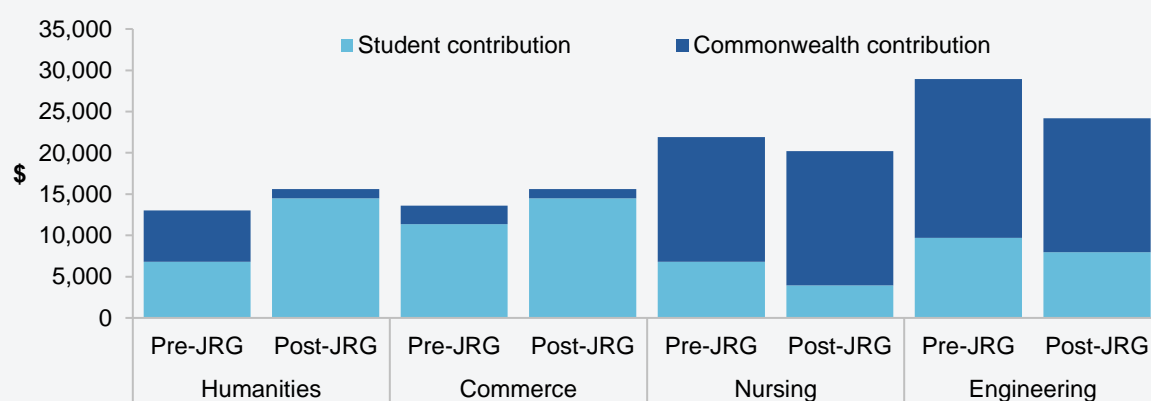
... encouraging study in fields most necessary for the jobs of the future and positioning Australia to capitalise on opportunities to increase productivity and national prosperity in the decades ahead. (DESE 2020, p. 23)

The objective was to direct funding ‘... to areas of expected employment growth, as well as industry and community priority’, by encouraging students to make more job-relevant choices (Tehan 2020). However, there is little public information about how the choices of fields receiving more (or less) in subsidies were made. For example, JRG encouraged students to take up the study of some fields, such as English and Foreign Languages, with some of the lowest estimated public and private benefits. Conversely the four fields with the highest estimated public and private benefits had their student contributions either remain similar or increase significantly (DESE 2020 pp. 17–20).

The package also changed Commonwealth Grant Scheme payments to universities. Previously, universities received less than the cost of delivery for some courses and significantly more for others (DESE 2020, p. 21).

The overall outcome was that total resourcing for each degree was changed, comprising changes to both the student contribution and the government contribution.

Job-Ready Graduates made large changes to prices and subsidies for some courses^a



a. Initial changes. Amounts will vary over time due to CPI indexation.

Sources: DESE (2020); Ferguson (2020a); Tehan (2020).

... but these rationales are flawed, particularly given income-contingent loans

While economically intuitive, the case for differential subsidies to encourage uptake of courses — in areas of labour market need or social priority — is flawed for three key reasons.

The public benefits of different courses are difficult to estimate

While there is strong evidence that public benefits exist, this does not extend to using them as a basis for determining subsidies.⁶² This is because changes to subsidies do little to induce student demand above counterfactual levels ('additionality') when students have high private benefits for choosing to study and will likely do so irrespective of the size of the subsidy. Norton (2017) for example, warned against using public benefits to estimate subsidies, noting that:

... the presence of public benefits does not of itself lead to sub-optimal levels of education. This will only happen if the total net private benefits are too low to justify enrolment. In those cases, tuition subsidies reduce costs and make it easier to get to positive net private benefits. ... Even though market failures are possible, with income contingent loans there are only limited empirical circumstances in which they actually exist.

As well as concerns regarding additionality, attributing public benefits by level of education is not clear cut. While tax benefits are likely to be larger for higher education qualifications, other social benefits, like reduced crime or addressing intergenerational disadvantage, are likely to be higher for Certificate I and II qualifications (PC 2020a, p. 112). Moreover, attributing public benefits by field of study is even more problematic — either requiring normative judgements about what professions are socially beneficial, or conceptually weak assumptions about the economic contribution of different sectors.

Similarly, there are significant limitations in the methods used to estimate skill needs (box 3.4). There is little evidence that differential subsidies effectively address skills shortages, particularly as some occupations have remained in persistent shortage for over a decade, irrespective of subsidy settings (PC 2020a, p. 113). A range of jobs, including hairdressers, arborists and panel beaters, have been deemed in persistent shortage for most years in the decade to 2018 despite subsidised courses on offer (PC 2020a, p. 329).

Box 3.4 – Skills shortages are a poor basis for setting subsidies

Governments set subsidies and available places to favour courses relevant to skills that are, or are predicted to be, in short supply. In VET, all State and Territory governments use skill lists to determine the courses eligible for subsidies, with the subsidy rate based on deemed skill shortages. Similarly, government subsidies for university courses vary by field of study depending on estimated employment prospects (box 3.3). This reduces the relative price of courses in these fields, encouraging enrolment.

⁶² While there is a consensus on the existence of public benefits of education, estimates of their magnitude — and therefore implications for subsidy setting — are more complex and long debated. Previous reviews have taken different perspectives on how subsidies should be set, from the Wran report (Committee on Higher Education Funding 1988) which established the design of the HECS system, to the more recent Bradley review (2008), Lomax-Smith review (2011), and Kemp-Norton review (Norton and Kemp 2014). Work by the Grattan Institute (Norton 2012) and Deloitte (Deloitte Access Economics 2016) — while proposing novel methods to estimate the public benefits of tertiary education — do not provide robust methods to inform subsidy determination.

Box 3.4 – Skills shortages are a poor basis for setting subsidies

However (apparent) skills shortages are a poor basis for setting subsidies both theoretically and methodologically.

- Subsidy differentials have little effect on behaviour (for reasons discussed further below).
- Market sector areas with genuine skills shortages elicit rising wages. Forward-looking students therefore already have incentives to study courses with strong employment and wage prospects. Course subsidies can therefore act as an ineffective and potentially inequitable transfer to people with good long-term prospects.
- The delay between training and working in the profession may be significant, such that the ‘shortage’ may have disappeared before a student graduates. Migration is likely a faster and more efficient mechanism for addressing skills shortages.
- To the extent that subsidies change behaviour at the margin, this may still be undesirable as it presupposes that students cannot make good choices themselves (discussed below).

There are also significant concerns about the methodology, currency, and underpinning conceptual framework of skills lists that suggest they are a poor basis for allocating subsidies (PC 2020a, p. 116). Skills lists are broad in nature and may not accurately reflect local skill needs (CCF, sub. 38, p. 5). For universities, which are less vocational in orientation, there are more fluid and ambiguous links between future jobs and the fields of study that might be relevant. For example, digital technologies like gaming require graphic designers and artists as much as software programmers.⁶³

Students are unlikely to respond to price differences

The overall demand for university enrolment in Australia is unresponsive even to significant price increases given ICLs and existing subsidies (Dawkins and Dixon 2015, p. 3).⁶⁴ This also appears to hold for the VET system (PC 2020a, p. 282). Students’ price insensitivity can be rational given the experiences, careers, and earnings resulting from a given field of study differ substantially, and compared with this, fee differences will have a far smaller impact on a student’s life.

The income-contingent and interest-free nature of Australian student loans mean that higher fees only affect a student’s finances at the date when they would have otherwise paid off their debt. For example, under changes made as part of the Job-Ready Graduates package, the student contribution for a humanities degree in 2021 doubled from \$6803 to \$14 500 per year. While this was a major change in price, its effect on additional loan repayments by the median humanities student with an ICL would only occur between ages 33 and 40 years, or some 15 years into the future (Chapman and Khemka 2022, p. 57). Indeed, early evidence of applications suggested little change, even in courses with large fee increases (Norton 2021).

⁶³ Inquiry participants have similarly raised concerns about Australia’s (similarly-derived) skilled occupation list for migration — discussed in this inquiry’s companion volume *‘A more productive labour market’*.

⁶⁴ A global meta-analysis of the responsiveness of enrolments to university tuition fees found price elasticities of close to zero, although the policy settings across countries are different (Havranek, Irsova and Zeynalova 2018).

This implies that, in the context of ICLs, very large changes to course subsidies would be needed to induce material increases in overall tertiary enrolments.⁶⁵

There is less evidence on the extent to which varying subsidies by field or course affects the choices of students who have already decided to attend a tertiary institution. However, early evidence from JRG suggests the effects for individual university courses are low due to the same moderating effect of HELP loans. This was borne out by a study which measured student responsiveness to price changes, treating the Job-Ready Graduates package changes as a natural experiment. This found that reducing a course fee by 10% would result in a trivial 0.4% increase in demand (Yong 2022a, p. 23).⁶⁶

Moreover, choices for specific tertiary education courses often reflect students' underlying interests and aptitudes, as well as factors like the courses' perceived quality, and how and where they are delivered (Brown 2017). Offering greater subsidies for a course of little interest to a student will not elicit a change in demand.

Students make good choices

Students appear to make good choices of their own volition. They have the best information about their own abilities and interests, making them well placed to make decisions about what they will enjoy — and benefit from — studying. During the Victorian Training Guarantee — which gave students a reasonably free choice in what to study — this 'improved the alignment of course enrolments with measures of prevailing skill needs, including enrolments of disadvantaged groups' (Polidano, van de Ven and Voitchovsky 2021, p. 1).

Policies that limit students' choices may lead some into training that does not align with their interests, which may be harmful to their careers in the long term. Some international evidence points to the benefits of students studying in line with preferences given that a student's comparative advantage is highly relevant to their labour market outcomes. For example, a Norwegian study examined students who were just above and below the admission score for a course in their preferred field, finding that their earnings usually increased when they were admitted to their first choice of course, even if it led them to study in a course with lower *average* earnings (Kirkeboen, Leuven and Mogstad 2016).⁶⁷

As such, it is important that financial incentives are broad and not limited to particular sectors, industries or skills, to support education that is best suited to each individual as well as the needs of the economy.

⁶⁵ Students *are* more responsive to subsidies where loans are not available. Evidence from the entitlement scheme implemented in Victoria points to significant VET uptake where there were few restrictions on course selection or caps on places (Polidano, van de Ven and Voitchovsky 2017, 2021). This program removed the significant financial barriers posed by limited loan availability, restrictions on government-funded places and large out-of-pocket costs associated with fee-for-service enrolments. The demand response was also particularly strong from disadvantaged groups, such as the long-term unemployed, for whom affordability is a greater concern.

⁶⁶ If anything, this is likely to overestimate student responsiveness. A necessary assumption (acknowledged by the author) is that nothing changed between cohorts enrolling in 2019 and 2020. Of course, this is not the case. COVID-19 likely affected student choice in many ways, in particular seeming to increase interest in health courses, with a spike in nursing applications. This may have upwardly biased the estimated response to the lower fee for nursing.

⁶⁷ For students whose first choice was science and second choice was social science, studying science increased their early-career earnings by \$70 000 USD. For students whose first choice was social science and second choice was science, studying social science rather than science increased early-career earnings by \$56 000 USD (Kirkeboen, Leuven and Mogstad 2016, p. 1091).

Options for improving subsidy allocation

‘Free’ tertiary places carry a fiscal cost and are unlikely to improve outcomes

Australia has required student contributions for tertiary education since the 1980s, when free tertiary education was gradually replaced by the current system of ICLs through HECS and HELP. This shift reflected concerns about the mounting taxpayer costs of fully subsidising a rapidly expanding system (PC 2019, p. 20). Moreover, it was recognised that free university involved a large transfer from all taxpayers to a predominantly socio-economically advantaged group with better career prospects. Put simply, free education transfers costs from those who study to those who do not. It is preferable to recover this cost more directly from those who benefit. As one commentator remarked, ‘it is not equitable for the average taxpayer to pay for trust-fund students’ law degrees’ (Yong 2022b).

A similar logic applies today. To offer free or cheaper courses, the Australian Government would have two options, neither of which meet sound equity or efficiency criteria. It could cut places to accommodate the higher costs, which would favour students with higher Australian Tertiary Admission rankings (ATARs) as this is the principal mechanism for rationing places. This would disadvantage students from lower socio-economic backgrounds who tend to have lower ATARs (Manny 2020) and would involve larger transfers from taxpayers to students with high expected lifetime earnings. Alternatively, the Australian Government could meet the costs of free university by raising taxes (which tends to discourage economy-wide labour supply and investment) or by cutting other government spending.

Free TAFE policies are also unlikely to provide community-wide benefits as suggested by the outcomes of this policy in Victoria (PC 2020a, pp. 94–97).

- Although enrolments increased at TAFEs, this probably reflected substitution from students who would have otherwise studied at private and community providers. For example, there were fewer enrolments in the Diploma of Nursing at non-TAFE providers, against the trend of previous years. Some private providers claimed that many students were feeling a financial pressure to study at TAFE.
- It weakened competition as the market share of TAFEs increased at the expense of private and community providers, diverging from the national trend. In some courses, TAFEs increased their already dominant market share, raising the concern that this limited contestability by other providers.

There is also no evidence that the quality of delivery is higher at public than private providers (PC 2020a, pp. 102–103). Students are equally satisfied with public and private RTOs, while employer satisfaction is higher for private RTOs. Therefore, free TAFE is not a means to increase quality of outcomes.⁶⁸

In that context, the additional cost of funding free TAFE would be better spent elsewhere, potentially on widening access to VET, other forms of skills acquisition or other ways of improving the education system.

Mass loan forgiveness of HELP (as well as VET Student Loans and remnant VET FEE-HELP) debt is sometimes seen as a desirable approach to alleviate financial costs on young people with large outstanding debts. As such a policy relates to already completed education, it could not enhance skills, and would be a purely redistributive measure. As in the case of free education, it would be regressive, benefiting those who have attended university and tend to have higher incomes, with the largest payments going to those who have completed courses with higher expected lifetime earnings, such as medicine, law, and engineering (DESE 2021b). At June 2022, the fair value of this debt was about \$50 billion.⁶⁹ For the same cost as

⁶⁸ Other levers are better deployed if quality is the major problem, for example in the first instance identifying poor performers and attempting to rectify their quality issues, regardless of ownership status.

⁶⁹ The ‘fair’ value of HELP debt reflects that a share of students will never pay off their debt.

cancelling all student debt, the Australian Government could give about \$5100 to every household (AIHW 2022; Commonwealth of Australia 2022b; Ferguson 2021b).

Nevertheless, there may be merit in free or heavily subsidised Certificate I and II courses given their large public benefits from developing foundational skills and the relatively low lifetime incomes of students. Debt forgiveness is also appropriate in some circumstances, for example where a student has undertaken a fraudulent course, as was frequently the case throughout the life of VET FEE-HELP. Indeed, many loans under that scheme have been forgiven (Commonwealth Ombudsman 2020).

Instead, subsidy rates should be changed to reduce the fiscal cost of additional places

The low responsiveness of students to course fees, particularly in the context of ICLs, suggests lower subsidy rates — and therefore higher student contributions — would have only negligible effects on demand for tertiary education. For a given funding envelope, higher student contributions allow a greater number of places to be supported. Therefore, in the presence of fiscal constraints, fee increases promote, rather than detract from, expanded access to education.

Additionally, as discussed above, it is also more equitable for students to incur a higher proportion of the cost of their education. Students receive substantial private benefits from tertiary education. They disproportionately come from socio-economically advantaged families and have good career prospects. And student contributions reduce the proportion of higher education that is funded through the general tax base.⁷⁰ Students are also protected if their education does not pay off. If they go on to earn only a low income, they may not repay all or even part of their loan.

This does not extend to VET. Under existing policies, the majority of VET students are not eligible for ICLs and providers are not subject to price caps (section 3.4). Any future recalibration of subsidies for VET to transfer more of the costs to those that benefit should only occur if ICL access is significantly expanded; and should be mindful of interactions with loan caps. Otherwise, there is a risk of undermining access to VET by imposing larger upfront fees. The Productivity Commission previously proposed methods to simplify subsidy setting in the VET sector, in place of the highly granular rates used in some jurisdictions (PC 2020a, p. 285). These recommendations remain relevant.

The student contribution should be set based on private benefits, with remaining course costs paid by government

Although the average level of the student contribution (and therefore the average subsidy level) is the primary determinant of the affordability of the system, how student contributions vary by field of study also affects the equity of funding arrangements and the share of debt that is expected to be repaid.

There are several options for subsidy setting. The simplest is a uniform subsidy for all courses, which could be either the same dollar value or the same share of costs. While price insensitivity means students would be unlikely to have their choices distorted by differences in course costs, this would still arbitrarily burden some students with far more debt than others, given differences in course costs by field of study (section 3.3). A higher proportion of debt would not be repaid, and the costs of higher education would be less equitably shared.

A superior model is to vary fees by private benefits, with students studying fields with higher expected earnings paying higher student contributions. Unlike the public benefits of tertiary education, which are difficult to quantify, information on the lifetime income profiles of students provides reasonable estimates of the private benefits of

⁷⁰ Including, for example Goods and Services Tax (GST) which is paid by all consumers, including those on low incomes.

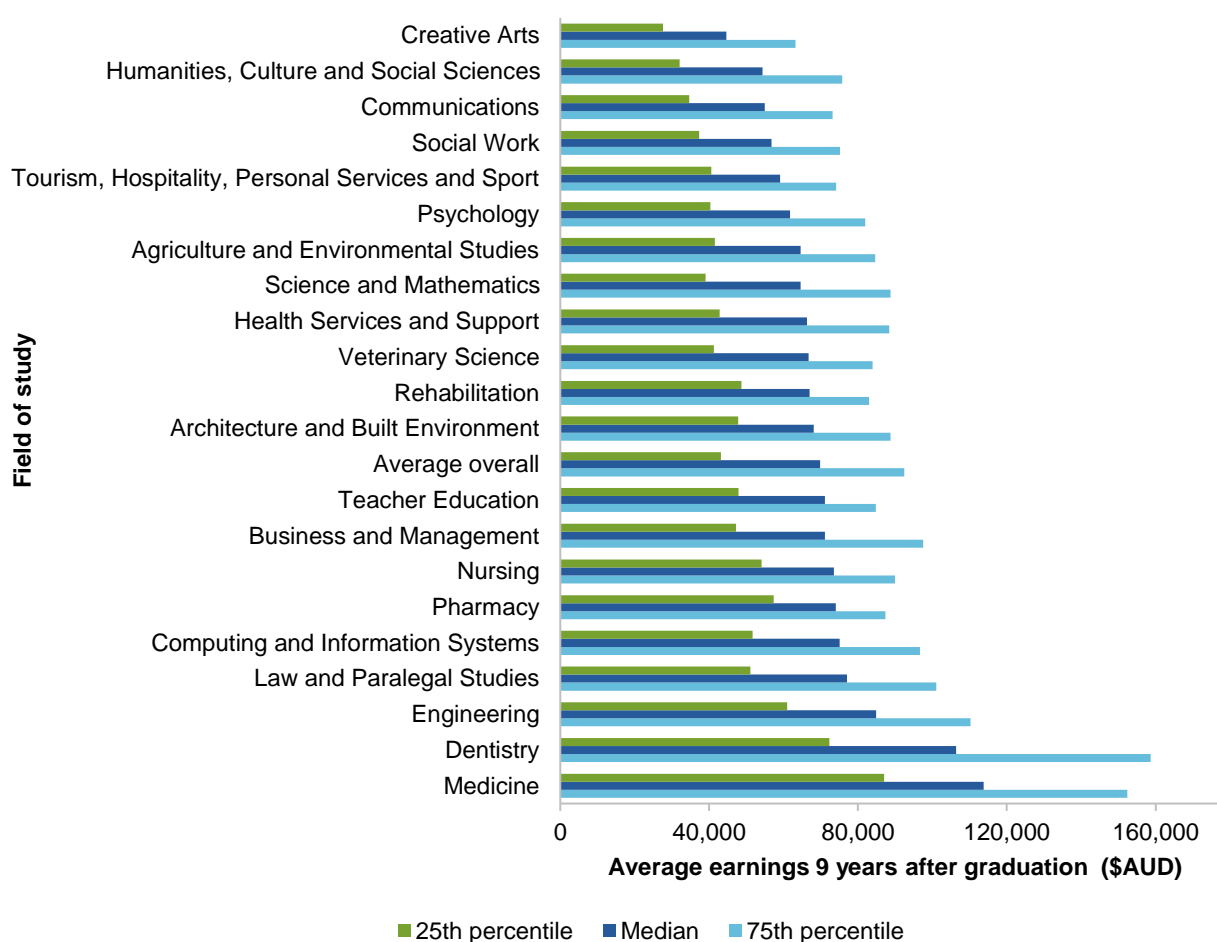
tertiary education (although these will not capture any non-financial private benefits). Employment rates and lifetime incomes are increased by greater levels of education — particularly from university (chapter 1). The high lifetime earnings of higher education graduates for certain fields suggests that many receive large government subsidies despite significant private benefits and strong incentives to attend (figure 3.4).

However, private returns are not high across all fields of study and there is significant variation in average incomes even nine years after completing study.

These benefits are not strongly related to the prices paid by students. In higher education, engineering, dentistry, and medicine students pay only moderate student contributions despite having the highest graduate earnings. And students in some of the lowest-paid fields of study pay the highest possible student contribution — even though the mismatch between their fees and their earnings means much of this debt may never be repaid. Better aligning student contributions with private benefits would create a more progressive system.

Figure 3.4 – The private benefits of education vary by field of study^a

Average earnings 9 years after university graduation, for those graduating in 2008



a. This provides only a weak proxy for earnings benefits, as it is difficult to attribute the earnings differentials directly to education. This chart contains data for those who graduated in 2008, and reflects their average income 9 years after graduation, in 2017-18.

Source: SRC (2021).

Three issues must be considered when setting higher student contributions for courses with higher private benefits. First, private benefits to education are not always financial and other factors — such as more favourable working conditions — cannot readily be quantified. This means that earnings are only a proxy for private benefits.

Second, some fields with comparatively low incomes — such as nursing and teaching — have wages that are heavily regulated and controlled by governments. To the extent that the real problem is excessive wage bargaining power by governments, the solution would be to set wages that would be offered in a more competitive labour market rather than to provide higher course subsidies. Of course, from a government fiscal perspective, payments to students that target new enrolments into the profession will cost less.⁷¹

Finally, ICLs already provide additional subsidies for students undertaking courses with lower lifetime incomes. This is because they reach the income threshold for repayment later (or never) and, as such, pay back a smaller share of their loan than other students. This provides additional grounds for extending ICLs to more qualifications in the VET sector (section 3.4).

The way forward

Currently, differences in student contributions by perceived labour market needs fail to meet their goals while arbitrarily increasing debt burdens on some students, and high levels of government subsidies challenge the sustainability of expanding access to higher education. To remedy this, the variation in student contributions should be lower and based on expected future earnings by field of study, while the level of student contributions should be higher, on average.

- This would mean a greater proportion of the costs of higher education will come from higher-earning students who will be less affected by repayments.⁷²
- Increasing the average student contribution would also support more fiscally sustainable demand-driven funding (recommendation 8.4). Depending on the magnitude of the increases, this could be budget-neutral.

The Australian Government should leverage the Australian Universities Accord process to consult the sector on this funding model. Given the design flaws of the Job-Ready Graduates package outlined above, the panel leading the Accord should progress this new funding model as a priority.

Student contribution arrangements should be grandfathered for students who have already commenced their study. Depending on the extent of changes in student contributions for particular fields of study, the Australian Government could consider phasing in new arrangements over a number of years.

Finally, while ICLs do not incur interest, they are indexed to inflation. This can mean that loans grow more than graduates' incomes during periods of low wage growth and high inflation (as has been the case recently). If student contributions are to increase, as a further protective measure, the Australian Government could amend loan indexation to move in line with the lesser of inflation and real wages growth.

⁷¹ Governments should be cautious in attempting to encourage students into particular fields of study. However, any efforts to promote study in certain areas would be more effective and efficient when involving cash payments to students, as proposed in the National Teacher Workforce Action Plan, rather than reducing course fees as with Job-Ready Graduates (Department of Education 2022a, p. 9).

⁷² Better matching student contributions to lifetime earnings would have a further benefit of reducing the share of debt that is not expected to be repaid.



Recommendation 8.5 Better targeting investment in higher education

The Australian Government should introduce a new university funding model to better target investment while facilitating wider access to higher education.

- Total university funding per student by field of study (comprising the student contribution and government contribution) should continue to be the cost of delivery for that field (reflecting a median estimate of efficient costs with the methodology to be refined over time as outlined in recommendation 8.6).
- The student contribution should be set based on average expected earnings for each field of study, with students with a greater capacity to repay incurring more debt. Student contributions should be higher, on average, to recoup a greater share of the costs of university from those who benefit from attending university, rather than recouping this from the broader tax base. This would also help to fund the return to a demand-driven system.
- The government contribution should make up the gap between the student contribution and estimated cost of delivery for each field of study.

3.3 Setting prices based on efficient costs

Poor price setting leads to poor provider incentives

Governments use price and loan caps to influence how funding is used within tertiary education. Unlike students, education providers are responsive to prices, which are set by governments for undergraduate degrees and for some parts of VET.⁷³ In instances where fees are *not* government regulated (such as for VET courses in most States and Territories), subsidy rates are applied to an estimated cost of delivery for a particular qualification — a form of ‘price’ (NSC 2021b).⁷⁴

Governments use estimates of the ‘efficient’ cost of delivery to set price caps, loan caps, and to calculate the base cost to which subsidy rates are applied.⁷⁵ Poor price setting can have major adverse impacts.

- **Prices set below efficient cost** may compromise the quality of courses offered, or — in the case of loan caps on VET courses — result in significant out-of-pocket costs for students by increasing upfront fees. As a result, other regulatory tools and provider performance indicators are important complements to ensure providers are not reducing service quality in the context of regulated prices.
- **Prices set above efficient cost** may undermine incentives to operate efficiently, reducing productivity. Price caps set higher than the efficient cost may not deter students from enrolling in the context of

⁷³ The ‘price’ of a course is the amount that a provider charges for education and training services. For government-funded courses, the price paid to a provider has two parts: a subsidy (paid by the government, also known as the government contribution) and a student fee (paid by the student or an employer, known as the student contribution).

⁷⁴ Where prices are not regulated, loan caps are also often used by governments as *de facto* price regulation to reduce the risk of unduly high prices, although providers can charge more than the loan cap, resulting in up-front fees.

⁷⁵ In a perfectly competitive market, the efficient price is the marginal cost incurred by the producer, or the cost of teaching the *next* student. This will of course differ based on the current number of students and the resources involved (staff, rooms, equipment, digital technology) — the cost of teaching the first student will almost certainly be higher than the cost of teaching the twentieth.

income-contingent loans, but would result in increased debt burdens and additional costs for the Australian Government associated with greater subsidies and non-repayment on the larger total debt.

Prices set below efficient cost in some courses and above in others pose further issues. Providers will have a financial incentive to encourage students into, and expand places in, courses for which they will receive a surplus, in favour of those where prices do not fully cover costs. For example, it has been argued that the cost estimates used to determine university funding overestimate the costs of commerce, humanities and law courses while underestimating the costs of science and engineering courses (Dodd 2020). If this is correct, this poses a significant risk to productivity by compounding financial incentives to channel students into fields that are mismatched to skill needs.

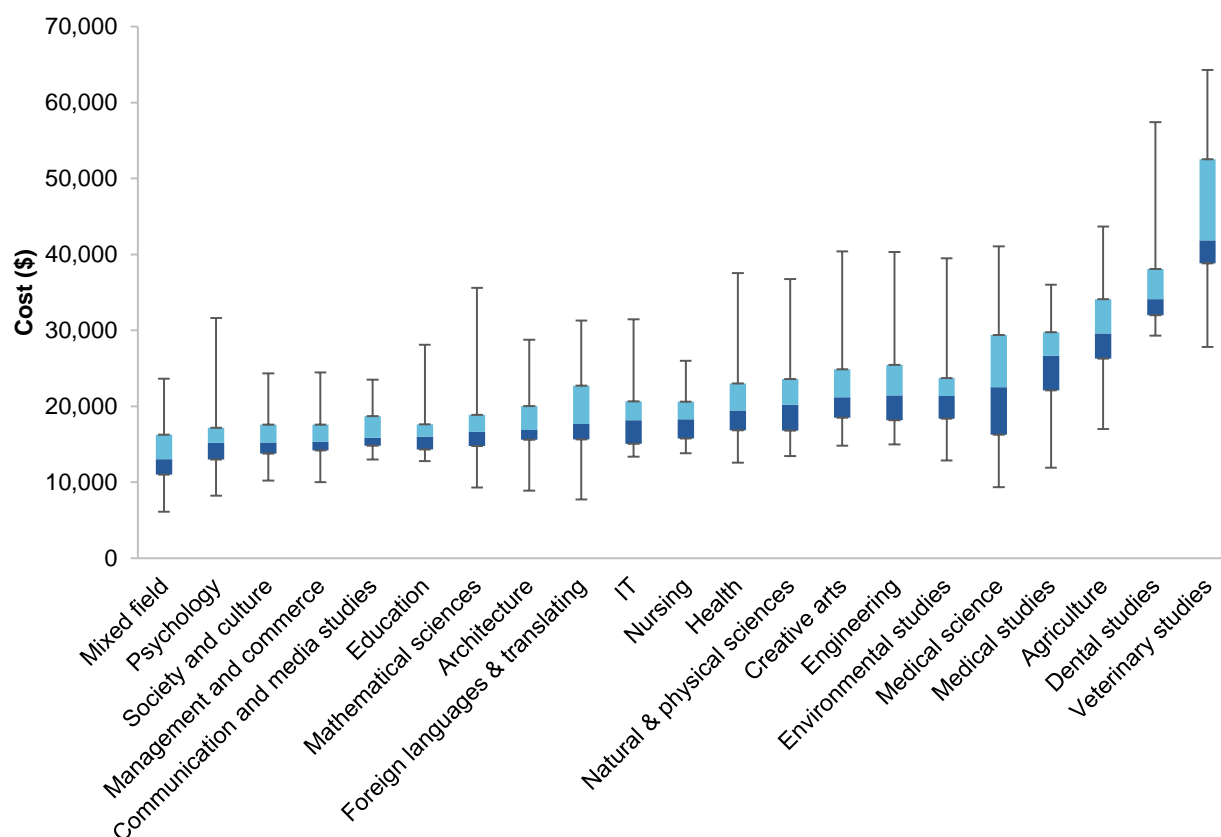
No pricing model is straightforward in practice.

Ideally, prices would be set at the minimum cost of teaching each additional student at the desired level of service quality. However, this ideal is challenging to achieve in practice. 'Marginal' costs will differ for different students and providers, the quality of education is difficult to accurately measure, and the link between specific costs and outcomes is not always clear.

Average cost pricing (that is, the average cost across all providers) may be easier to implement but has its own shortcomings. Marginal costs are likely to be lower than average costs, which means that offering more places leads to a surplus that can cross-subsidise other activities (such as research). Furthermore, the difference between marginal and average costs will vary by field of study (depending on the mix of fixed and variable costs). This creates an incentive to enrol more students in courses where the difference is greater — and fewer where it is smaller, such as science, engineering, and medical fields where the need for equipment, practicals, or placements means there will always be significant costs to enrolling more students.

Estimating 'efficient' costs introduces further difficulties despite its strong appeal as an incentive mechanism for providers. There are very wide differences in the estimated costs of delivery by different universities, only some of which will reflect differences in efficiency (figure 3.5). In this context, an average cost derived from historical expenditure provides a practical benchmark for moving toward efficient pricing, although historical costs may deviate from the theoretical 'efficient' cost. Median (rather than mean) costs, as are currently used, can limit the impact of some providers having unusually cheap or expensive courses.

Figure 3.5 – Costs of course delivery vary substantially by institution^a
Distribution of estimated costs per student (EFTSL) by field of study in 2020^b



a. The boxes represent the universities with costs between the first and third quartiles, with the colour change marking the median cost institution. The 'whiskers' show the institution with the highest and lowest cost. For some fields of study, data are available for 37 institutions, for others there are as few as six. Three outliers were not included in the graph: a Mixed Field course costing \$67 994, an Environmental Studies course costing \$60 494, and an Agriculture course costing \$93 831. Each was more than 50% higher than the next most costly course. b. EFTSL is equivalent full-time student load. Source: Deloitte Access Economics (2022).

Cost data can (still) be improved

The Productivity Commission has previously highlighted the importance of cost-reflective resourcing for Commonwealth supported places in universities (PC 2017c, p. 2). Since then, the Australian Government revised the maximum price in line with estimated costs of delivery as part of the Job-Ready Graduates funding reforms. This major change — the first to explicitly separate the costs of teaching and research — was a crucial step toward cost-reflective resourcing for universities (box 3.5). The Australian Government also increased the frequency of an exercise to collect data on the costs of teaching at universities, known as the *Transparency in Higher Education Expenditure* (Deloitte Access Economics 2022).⁷⁶

Similarly in VET, the Australian Government introduced reforms to provide a national evidence base to estimate the costs of delivering VET qualifications, coordinated through the National Skills Commission (NSC) (now replaced by Jobs and Skills Australia) (Ferguson 2020b). A core part of the NSC's functions involved collecting better data on the cost of delivering qualifications, given significant variability in the

⁷⁶ This initiative establishes common cost allocation methods to estimate the cost of delivering different qualifications.

methods used across jurisdictions, which often rely on poor or outdated data (PC 2020a, p. 279). This information could then inform State and Territory governments' VET subsidy determinations. This process should be continued, and is likely to be best placed within the remit of Jobs and Skills Australia.

Box 3.5 – Breaking the nexus? Separating research and teaching costs

A key change from the Australian Government's 2020 reforms to university funding was the explicit separation of teaching and research funding, and the alignment of funding to the costs of teaching:

Better aligning funding with the cost of teaching will fix distortions in the funding system and ensure universities can respond to student preferences ... (DESE 2020, p. 14)

However, many stakeholders from the university sector claimed the importance of the research-teaching nexus (NTEU, sub. 36, p. 7), stating that these core activities were not separable from a funding perspective. There is limited evidence to support this claim (chapter 4). Rather, as the Productivity Commission previously noted (PC 2017c, p. 41):

... various empirical studies in Australia and elsewhere have found little evidence to support a positive relationship between teaching outcomes and research capabilities ... [e]vidence that finds no reliable link between research and teaching quality does not mean that universities should forgo trying to nurture a link, however. If a university can succeed in raising teaching quality through synergies with research, then it increases its attractiveness to students ...

A key benefit of separating research and teaching costs for funding is that it provides a better basis for establishing the actual cost of each activity, where prior evidence points to ongoing cross-subsidies (Norton and Cherastidham 2015). Moreover, separating research and teaching for funding purposes can improve comparability across tertiary institutions, as VET and non-university higher education providers do not typically hold research functions.

While these developments improve the transparency and reliability of data on the costs of delivering tertiary education, further analysis would be beneficial, including:

- **better cost allocation methods** — there may be an opportunity to improve the robustness and comparability of future cost exercises by including greater granularity of cost attribution (for example, allocating costs between undergraduate and postgraduate education within faculties) and using more realistic assumptions about allocation of staff time. There may also be scope to better account for the costs of scholarship, capital, and research (Higher Education and Research Group 2020; Massaro 2020)
- **greater breadth of collection** — the most recent exercise has expanded to include all Table A public universities (Deloitte Access Economics 2022).⁷⁷ Extending a comparable exercise to a broader sample of VET providers would also improve accuracy of cost estimates and scope for benchmarking efficient costs. This could take place as part of a consolidated costing exercise across sectors through a central function within government, such as Jobs and Skills Australia

⁷⁷ Although, current funding levels are based on the previous costing exercise which included only 32 out of 37 Table A public universities.

- **a linked cost exercise for research activity** — despite previous government commitments, data on the cost of delivering research is deficient.⁷⁸ A cost exercise for research is essential to improving cost estimates of both research and teaching and for providing a basis to understand appropriate funding levels for research. Overseas examples suggest this is feasible, as in the UK’s Transparent Approach to Costing, which covers research and teaching costs.⁷⁹ It is also necessary to consider research costs when adjusting funding for teaching, given many institutions currently rely on cross-subsidies from teaching to cover indirect costs of research
- **introducing greater benchmarking over time** — using historical cost data for regulated prices can create an incentive for providers to inflate costs over time to increase revenue (‘gold-plating’). In this context, benchmarking the cost of provision between providers in Australia and overseas is an important safeguard (Houghton, Bagranoff and Jubb 2021). Benchmarking can be also inform an understanding of ‘efficient’ costs when services vary substantially between institutions.

Governments have implemented policies that lay the foundations for reliable cost estimation exercises in recent years, but the adjustments described above would improve current arrangements. Costing exercises need to consider the biases that can occur if they do not adequately capture variations in quality. Failing to adjust for quality could undermine the funding of productivity-enhancing, but more costly services. While useful for price setting, cost exercises are only one aspect of understanding provider performance and the sector more broadly (as explored in detail in chapter 4).

Given the significance of cost estimation for funding decisions — and that misestimation can pose a risk to quality or distort providers’ incentives — it is essential to cultivate greater confidence in tertiary education cost data. Depending on the accuracy of current figures, improvements could remove an impediment to the efficient matching of student to courses, improving education and labour market outcomes.



Recommendation 8.6 Improve price setting in tertiary education

The Australian Government should conduct regular costing exercises to estimate the cost of delivering tertiary teaching and research. The methodology underpinning these cost exercises should be periodically reviewed and refined to inform more accurate cost estimates, and should aim to ultimately reflect only efficient costs. These cost estimates should inform funding as well as price and loan caps, to encourage efficient delivery of quality education and research by tertiary institutions.

⁷⁸ The ABS conducts the Higher Education Expenditure on R&D (HERD) Survey every two years. However, expenditure is reported in high-level categories and is not reported on an institutional basis.

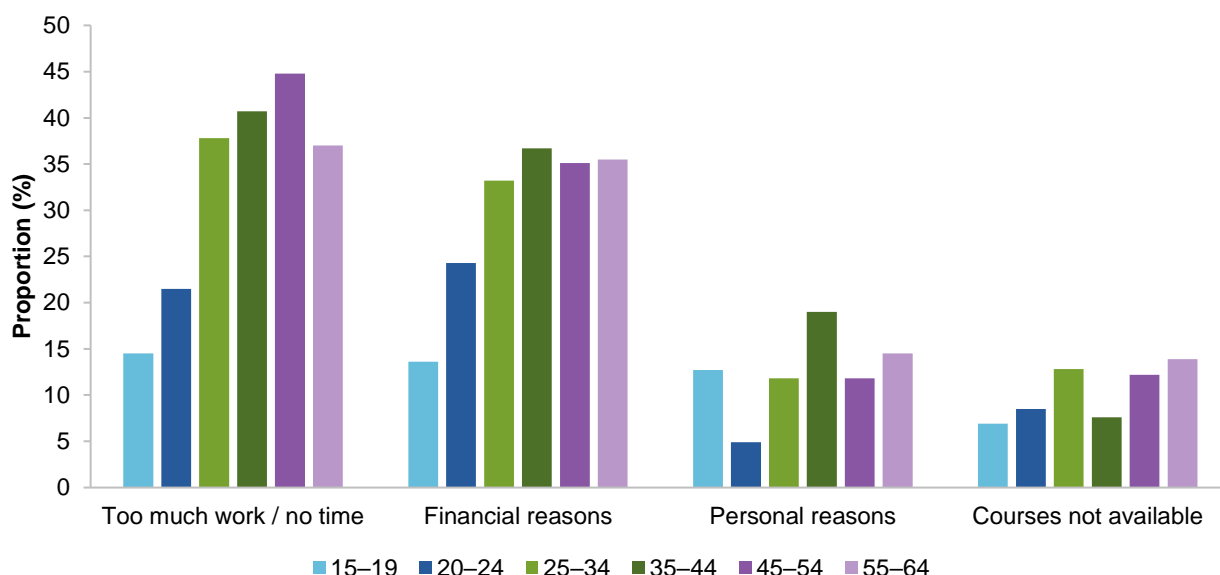
⁷⁹ The United Kingdom Government’s Transparent Approach to Costing focuses on the share of total costs that are incurred by teaching, research, and other activities. It provides an example of the simultaneous measurement of teaching and research costs, and allows for analysis of drivers of costs, although it does not attempt to estimate the costs of delivery for different courses (Office for Students 2018). In the United States, the Higher Education Research and Development (HERD) Survey collects information on research costs at 910 (as at January 2023) universities and colleges, providing extensive information on cost components and how they change over time (NSF 2020). The University of Delaware also collects annual data on university teaching costs across multiple disciplines at nearly 700 institutions (Hemelt et al. 2018; University of Delaware 2022).

3.4 Harmonising loan settings to increase access to tertiary education

Financial barriers prevent some Australians from pursuing education (figure 3.6). About 7% of Australians aged 20-54 years who did not participate in formal study in the past year wanted to, but could not, with one third of them listing financial barriers as a reason (ABS 2022g). About 60% of those who listed financial barriers wanted to enrol in a qualification below the bachelor level, suggesting financial barriers are greater for VET.

Time constraints alone limit students' capacity to fund their study by working, yet many do not have access to enough savings to fund study. ICLs are generally available for higher education and overcome the barrier of upfront tuition costs. However, such loans are highly restricted for VET students.

Figure 3.6 – Financial barriers prevent many people from formal study^a
Reasons those who wanted to engage in formal study could not



a. Multiple options could be selected. This survey was undertaken during COVID-19, and there was an unusually high proportion of respondents choosing 'Other' reasons why they could not access study. This has been omitted in this chart. The respondents include those wanting to enrol in a higher education qualification, although barriers were more likely for those wishing to undertake vocational education or training.

Source: ABS (*Work-Related Training and Adult Learning, Australia, 2020-21 financial year, Cat. no. 4234.0, table 14*).

This is problematic as vocational education is a reliable path to employment in many areas at risk of skill shortage or with high projected employment growth, from the trades to aged care. The former NSC projected that while 53% of newly created jobs over the next five years will require higher education, 39% will require vocational education (NSC 2022a). Ensuring access to VET for students at initial career stages and for those upskilling and reskilling is important. For many students, VET is their best chance at a fulfilling and productive career, whether due to their strengths, their interests, or their desired career path.

Income-contingent loans are an effective tool to reduce course costs, but current policy settings create distortions

ICLs provide students with credit to pay course fees. They differ from conventional 'mortgage-style' loans in that repayments are deferred until the borrower earns more than a set threshold. Repayments are calculated

as a percentage of income above this threshold and on a sliding scale. ICLs allow students who could not otherwise afford to pay course fees to defer payment to a time when they have higher incomes. ICLs have been successful in higher education, but their rationale applies equally to VET, where their use is highly limited. The VET Student Loans (VSL) program is available for only some courses at Diploma level and above. In 2019, only 277 of 635 Diploma courses were eligible for VSL, despite many ineligible courses having strong employment outcomes (PC 2020a, p. 301). And VSLs are not available for any course below the Diploma level. This means that VET students, unlike higher education students, often face upfront fees.⁸⁰

The lack of harmony in funding arrangements between higher and vocational education can mean poorer matching of skill formation with skill needs. This arises for a few reasons.

- Upfront costs may discourage some people accessing VET altogether — meaning they miss out on any kind of post-school study despite its growing necessity. This is costly for students and society, as completing VET courses improves students' earnings (Polidano and Ryan 2016). These damaging effects may be larger for more disadvantaged students for whom an upfront fee is more burdensome.
- Students may elect to undertake lower cost VET courses even if these produce lower returns.
- Students unable to meet the upfront costs of VET may opt for university instead even when it is not efficient for them to do so (Norton, Cherastidtham, and Grattan Institute 2019). Some higher education students have poor outcomes, either not completing their qualification or not finding relevant employment, with costs to the students and government. At least some of these students would have completed their studies and entered their desired job if they had been able to undertake a VET qualification. The likelihood that differential access to ICLs leads to switching between university and VET providers will probably mostly relate to Diploma courses.

The VSL scheme has succeeded in removing financial barriers to VET for the eligible courses. Almost all VSL students (94%) reported that, without their loan, they would not have been able to afford their course fees (KPMG 2020, p. 104). But this also suggests that financial barriers are significant for students unable to access a loan.

Expanding loan access to more VET courses

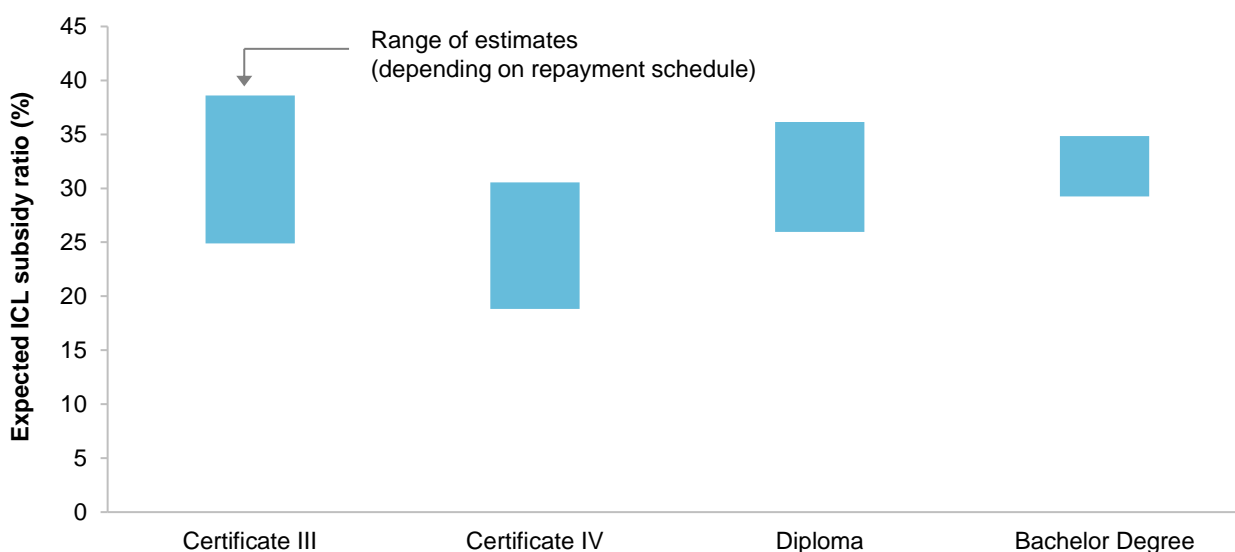
For these reasons, there is merit in expanding VSL to more Diploma-level courses, as well as potentially to Certificate IV and III courses. Certificates IV/III provide comparable increases in earnings and other employment outcomes as Diplomas (Polidano and Ryan 2016a, p. 31), and these courses are often shorter and cheaper, meaning debts are likely to be smaller. While their lower costs mean that the barriers posed by upfront fees will typically be less than for Diplomas, the costs can still be significant for some cohorts. If students are only able to access loans for Diplomas, they would be financially encouraged to take higher-level VET courses even if these suited them less well.

⁸⁰ Students that are accepted into university for undergraduate degrees receive a Commonwealth supported place, and have the costs of their education subsidised by the Australian Government, with the remainder of the cost of the qualification deferred through an income-contingent, interest-free loan known as HECS-HELP. University students that do not receive a Commonwealth supported place — for example, because they are undertaking a master's degree — are also often eligible for another ICL, FEE-HELP.

Some participants in this inquiry argued ICLs should not extend to Certificate III. For example, JCSF Consulting submitted that rather than ICLs, full public subsidy may be justified due to poorer employment outcomes⁸¹ and as Certificate III is also undertaken by students enrolled in school (sub. 97, p. 3).

Repayment prospects appear to be qualitatively similar across AQF levels, including Certificate III (figure 3.7).⁸² Nonetheless, expansion of loan arrangements poses some budgetary risks, particularly as the share of VET students undertaking Certificate III courses is significant.⁸³

Figure 3.7 – Repayment prospects are reasonably similar across AQF levels^a
Expected ICL subsidy ratio by qualification under various repayment scenarios



a. Original modelling results were separated by gender; they have been pooled according to the gender split at each level. The upper range estimate corresponds with 2015 HELP repayment terms, and the lower range estimate corresponds with 2015 HELP repayment terms plus 3% of income between \$50 000 and \$54 000, 2% of income between \$40 000 and \$50 000, and 1.5% of income between \$35 000 and \$40 000.

Source: PC (2020a, pp. 312–314).

Expansion of VSL should be gradual and informed by evaluation

A gradual and cautious approach to expansion is warranted, as students and RTOs may not always respond to ICLs as expected; and students undertaking Diploma and above courses can have differing characteristics to those undertaking certificate courses.

The Australian Government, in consultation with State and Territory governments, should extend VSL eligibility. Initially this should include all Diploma and above level courses with minimal exclusions. Rather

⁸¹ Note that Certificate III completers have poorer employment outcomes compared with Certificate IV completers, however the *uplift* in income relative to not having the Certificate is similar for both cohorts (as Certificate III completers may have done worse in the absence of the certificate) (Polidano and Ryan 2016).

⁸² While the modelling underpinning the estimates appears to show that ICL recovery rates are more positive for Certificate IV level courses than bachelor degrees, this may not be a robust result for two reasons. First, the estimated average loan size for Certs III and IV may be too low, and second, the modelling does not exclude Trade Support Loan Students, who already have access to ICLs, and have positive repayment prospects. A full summary of these issues is discussed in box 10.2 in the Commission's review of the Skills and Workforce Development Agreement (PC 2020c).

⁸³ In 2021, the highest number of VET qualification enrolments were at the Certificate III (39%), followed by Certificate IV 20%, and Certificate II (19%) (NCVER 2022b).

than current eligibility restrictions (which exclude more than half of Diploma and above level courses), only courses that are primarily undertaken for leisure or that yield poor employment outcomes should be excluded. After monitoring and evaluating this change, assessing impacts on participation and employment outcomes, VSL could progressively be extended to Certificate IV courses. Subsequently, an expansion to Certificate III could also be considered, based on an assessment of whether expansion to Certificate IV was successful and the latest information about repayment prospects for Certificate III.

Before each stage of expansion, the Australian Government Actuary should be tasked with investigating more thoroughly how different repayment settings would affect debt recovery. As in the case of HELP loans, the precise income thresholds for repayment will need to be assessed as a necessary component of any ICL scheme is to not require full repayment if future income is low.

The argument to expand loans to shorter courses is less compelling. Certificates I/II generally provide smaller and less consistent earnings benefits (Polidano and Ryan 2016), and they are also heavily subsidised. And while microcredentials contribute to lifelong learning, they are generally cheaper and more likely to be undertaken by those already in the workforce and funded by employers or by private means (section 3.5).

Controls are needed to avoid another VET FEE-HELP debacle

Many in the VET sector are wary of extending ICL to more VET students due to the rorting that occurred under VET FEE-HELP (VFH), the predecessor to VSL. The implementation and regulatory oversight of an expansion would need to be mindful of avoiding the unscrupulous behaviour seen under VFH, although the regulatory framework underpinning VSL has addressed many deficiencies of VFH. In particular, VSL involves: stricter compliance measures for providers; a ban on loan brokers; students regularly reporting their engagement; and, payments to RTOs being made in arrears (rather than in advance under VFH) (PC 2020a, p. 298). These measures have seen VSL successfully avoid the pitfalls seen under VFH. Strong regulation, with ASQA playing an active role, will need to continue to ensure the integrity of an expanded VSL scheme over time.

The gradual expansion approach outlined above will also assist in mitigating the risks, as lessons can be learned — and adjustments made — after evaluating each phase of expansion.

In the recent review of the Skills and Workforce Development Agreement (NASWD), the Productivity Commission recommended that upfront loan charges be levied on students so that they have ‘skin in the game’ when choosing a course. However, in practice, when contemplating a course, the time commitment and opportunity cost is likely to be a more important factor in decision making than a nominal upfront fee. Further, upfront fees have not been needed to protect students taking up HELP or VSL loans. The risk of poor decisions by students seen under VFH were likely largely attributable to aggressive marketing strategies that have now been banned. Controls on unscrupulous behaviour are more effectively placed on providers, rather than through upfront fees for students. Students would also benefit from the Commission’s recommendation to address information gaps, including relating to student fees and RTO quality (PC 2020c, p. 210).

Finally, loan caps are necessary to limit costs to students and the Government. As ICLs reduce student sensitivity to course fees, their wider application means that providers may be able to increase course prices well above their delivery costs. Under a loan cap arrangement, RTOs are not prevented from charging fees higher than the cap. However, as the student pays the difference, they must be convinced that the additional cost is justified. In its review of the NASWD, the Productivity Commission recommended that the number of loan caps be expanded, and reformulated based on efficient delivery cost data (PC 2020c, p. 322).

Loan fees should be applied equitably to all tertiary loans

A loan fee is a charge added to a student's loan to increase cost recovery across the cohort, limiting government spending. The loan fee is added to the value of the loan; upfront payment is not required. This means that loan fees are unlikely to impact student choices about what to study.

However, they are not currently applied equitably. A loan fee of 20% applies to VSL students receiving training from a fee-for-service provider and students at (non-university) institutes of higher education. There is no compelling reason why this fee does not apply to students in subsidised places (or, for that matter, university students). There is no evidence that repayment risk varies between these student cohorts. Some participants advocated for consistent loan fees (JCSF Consulting, sub. 97, p. 3; IHEA, sub. 120, p. 4).

Loan fees are progressive as higher income graduates cross-subsidise lower income graduates who repay more slowly or do not fully repay. Spreading loan fees to a broader student base would be more equitable and could allow for the loan fee to be levied at a lower rate. For example, the Grattan Institute suggested a universal loan fee for all HELP loans could be levied at 15% (Norton and Cherastidham 2016). The Productivity Commission found a loan fee of about 9% applied to all VSL would be budget-neutral (PC 2020c, p. 324), although this may need to be adjusted for any expansion of VSL.⁸⁴ Ideally, loan fees should apply equitably to all tertiary students, and at a lower rate that accounts for the repayment risk across the full cohort.

Finally, even with loan fees, some share of debt will not be recovered. ICLs are provided by the Australian Government, while VET subsidies are borne by State and Territory governments. Accordingly, expanding loans may encourage State and Territory governments to reduce VET subsidies. To mitigate the risk of this type of 'cost-shifting', both levels of government will need to negotiate to either extend current sharing arrangements for VSL debts not expected to be recovered (and concessional interest costs) or offset this cost by adjusting the Australian Government's funding component.

⁸⁴ Further, as this only accounted for VSL, a uniform loan fee across all higher education and VET loan programs could be budget-neutral at an even lower rate (given the large share of undergraduate university students compared with students attending other providers).



Recommendation 8.7 Expand loan eligibility to more students

The Australian Government, in consultation with State and Territory governments, should gradually expand VET Student Loan eligibility.

- Access should expand to more Diploma and Advanced Diploma level courses. Instead of current criteria, all courses should be eligible except those that are primarily taken for leisure or have demonstrated poor labour market outcomes. This expansion should be evaluated after a suitable period, including observed effects of the earlier expansion on student participation, course decisions and employment outcomes; and any evidence of rorting by providers. Following this evaluation, and addressing any implementation issues, eligibility should also be considered for Certificate IV and Certificate III courses.
- Loan fee arrangements should also be equalised across the tertiary sector, levied on all students regardless of type (that is, extended from fee-for-service VET students and non-university higher education students to include subsidised VET students and university students). The loan fee rate should also be lowered reflecting application to a broader base of students.

3.5 A culture of lifelong learning for an agile workforce

Lifelong learning, however achieved, is critical to stable employment, wages and the adaptability of an economy (PC 2020c, p. 416). Labour market trends suggest a growing need for upskilling and reskilling given changes in the nature of work and structural shifts in the economy, particularly the rising importance of digital, dynamic, and service-oriented skills.

Participants emphasised the role of lifelong learning and the need for digital skills in the workplace.⁸⁵ Some estimate that workers (between 2018 and 2040) will need to spend an additional three hours of learning per week, which is about a 33% increase (AlphaBeta 2018, pp. 3–4). The average Australian worker is expected to change occupations 2.4 times by 2040 and have the nature of their work tasks change by 18% every decade (AlphaBeta 2018, pp. 3–4). It has been asserted that ‘the days of relying on an increasingly dusty certificate or degree over a 40 to 50 year career are long gone’ (BCA, sub. 181, p 12), although this probably underestimates the degree to which lifelong learning has been important in the past.

Like all forms of education, learning in adulthood can improve worker productivity by building on and expanding skills, and enabling movement to new industries with greater demand and higher wages. Increasing job related skills and job prospects are the two main reasons for participating in formal study (ABS 2022g).⁸⁶ Indeed, research has found that mature-age education has positive (though modest) impacts on wages, job satisfaction, retention and higher use of skills in workers’ jobs (Coelli, Tabasso and Zakirova 2012). There is some evidence that completing vocational qualifications that are no higher than the highest level of education already attained does not improve labour market outcomes (Polidano and Ryan 2016).

⁸⁵ See for example: BCA, sub. 181; Internet Association of Australia, sub.168; JCSF Consulting, sub. 97; The Software Alliance (BSA) sub. 134; Australian Investment Council, sub. 135; AHRI, sub. 54, ASBFEO, sub. 64.

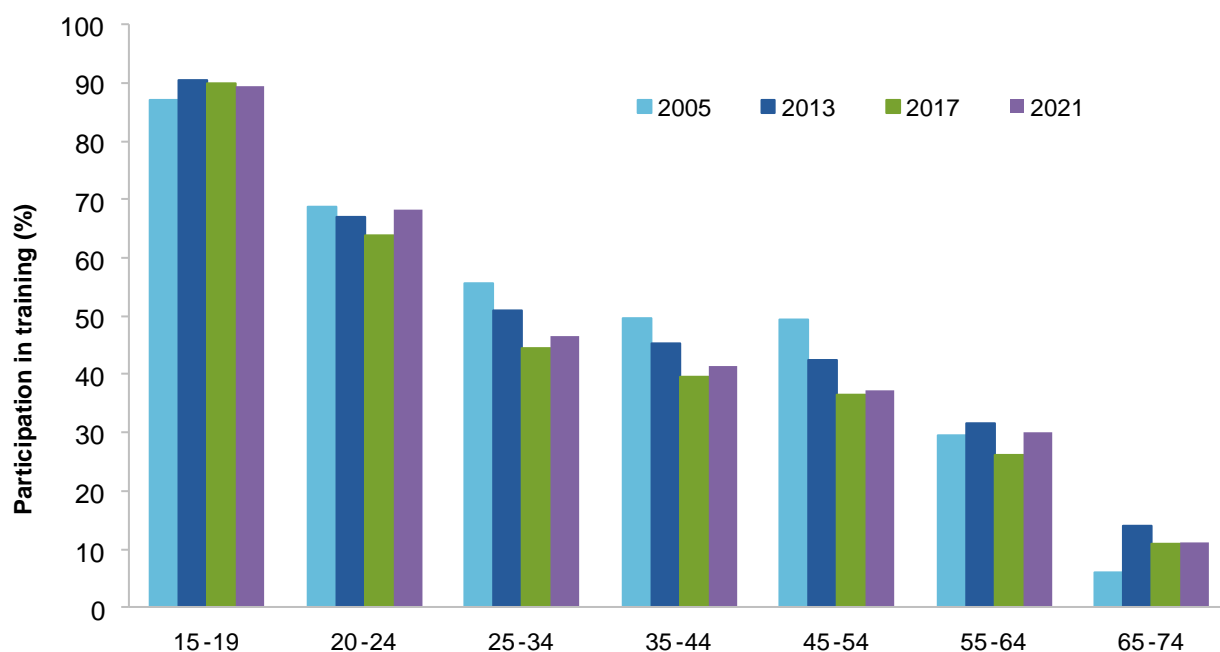
⁸⁶ That said, increasing job prospects is a more important motivator for learning earlier in life with an average of 48% of 25-44 year-olds reporting it as their main reason for study compared with adults aged 45-64 (34%). Individuals have various private motivations to study later in their careers, including higher salaries and greater work satisfaction.

Positive spillovers from lifelong learning are likely to increase as working lives lengthen and as evolving skill needs require upskilling or reskilling (chapter 1). For example, it can help displaced workers transition to new occupations and industries. This could help to avoid or shorten unemployment spells and lower transition costs, particularly in some regional areas where an inadequate skills base is an impediment to economic transition (PC 2017b, p. 73).

Lifelong learning also has broader benefits beyond improving employment outcomes — such as personal empowerment, engaged citizens, improved health outcomes, financial literacy and wellbeing — a point noted by practitioners in the Adult Community Education sector (Mason and Carr 2021, p. 129).

Australia has relatively high adult participation in formal training among OECD countries. Australia has the equal highest rate of enrolment for people aged 40–64 years (3 times the OECD average), and equal third for people aged 30–39 years (2.3 times the OECD average) (PC 2020c, p. 417). Adult learning occurs in many contexts — formally, at universities, VET providers and more informally at work, from local communities and libraries. Some 42% of Australians aged 15–74 years have participated in formal or non-formal training in the past 12 months (ABS 2022g).⁸⁷ But there has been some decrease in training since 2005 among people aged 25–55 (figure 3.8). Demand for lifelong learning is difficult to cultivate, and requires equipping young people with the skills to learn early, as well as a collective acknowledgement of the benefit and value of ongoing learning.

Figure 3.8 – There has been some decrease in learning by 25–55 year-olds since 2005^{a,b}
Participation in formal or non-formal learning by age group



a. Comparison between 2005 and other years should be made with caution due to different methodology, scope and sample size. In particular, 2005 data (SEW) was based on a household interview with any responsible adult on behalf of all persons aged 15–74 years in the household. Whereas 2013 onward (WRTAL) was based on an interview with one randomly selected person aged 15–74 years in the household. **b.** Participants interviewed were asked if they had undertaken learning in the previous 12 months, although the relevant 12-month window varied between iterations of the survey (2017 and 2021 refer to the 2016–17 and 2020–21 financial years respectively).

Sources: ABS (*Work-Related Training and Adult Learning, Australia*, for Apr 2013, 2016–17 and 2020–21, Cat. no. 4234.0); ABS (*Education and Training Experience, Australia, 2005*, Cat. No. 6278.0).

⁸⁷ Formal training results in a qualification or certification.

Current government support is focused on initial skill acquisition

Governments also support lifelong learning through a range of programs and funding mechanisms (box 3.6). While most programs are neutral in respect of the life stage of the person, much of this investment is directed at formal qualifications and initial skill acquisition completed earlier in life.

- In VET, a greater proportion of younger students are government-funded, with 51% of students receiving government funding aged between 14–24 years in 2021.⁸⁸
- In the university sector, higher-level degrees typically have far fewer Commonwealth supported places than undergraduate courses. More generally, older individuals are less likely to enrol in university than in VET (Coelli, Tabasso and Zakirova 2012).

This reflects the importance of education in the first 18–25 years of life as younger people require broad foundational skills and credentials to secure early-career jobs (PC 2020c). Earlier investment in education and training can also create larger economic benefits and positive spillovers. A person who completes their degree, certification, or apprenticeship early in life may spend 50 years in the workforce, contributing to the Australian economy and its productivity (Polidano and Ryan 2016).

Moreover, early educational attainment is important for teaching people how to learn and improve their ability to pick up new skills and is one of the strongest predictors of further training and learning (OECD 2021a). On average, across the OECD, individuals with tertiary education were twice as likely to engage with adult learning than those with secondary education or below (OECD 2021a). Starting a culture of lifelong learning requires a strong foundational education and the skills and attitudes needed to support a curiosity and interest in further training throughout life.

Box 3.6 – A range of government policies support learning later in life

A number of policies support learning later in life. Key Australian Government policies are outlined below, and other policies exist at the individual State and Territory level.

Income-contingent loans available for higher education courses and some diplomas are not limited by age. Total caps on loans are sufficient to enable most learners to undertake initial qualifications as well as further learning later in life. Subsidies for tertiary education are also available to people of all ages, although there may be fewer places for postgraduate courses.

Personal education expenses may be eligible for a tax deduction if courses result in a formal qualification, relate to current work activities and skillsets, and will likely result in higher wages. A minimum threshold of \$250 for deductible expenses was removed in December 2022 to account for cheaper, shorter courses (ATO 2022a).

MicroCred Seeker, an online marketplace for microcredentials funded by the Australian Government and built by the Universities Admissions Centre (UAC) in 2022, provides potential students with comparable information on microcredentials offered in Australia. Australian higher education providers registered with TEQSA are currently able to list their courses.

In the 2020-21 Budget, the Australian Government funded an additional 50 000 **Commonwealth supported short course places** in national priority areas (Department of Education 2022b).

⁸⁸ Commission estimates based on VOCSTATS data, 2021.

Box 3.6 – A range of government policies support learning later in life

The **Small Business Skills and Training Boost** (announced but yet to be legislated), encourages small businesses to invest in ongoing training. Under the boost, businesses with less than \$50 million in annual turnover that invest in eligible courses for their employees will receive an additional tax deduction of 20% of the training expenditure between 2022–2024 (ATO 2022b).

Targeted employment programs also support further training.

- Workforce Australia (replacing Jobactive from 4 July 2022) helps underemployed and unemployed individuals to navigate and subsidise training and reskilling to improve labour force outcomes (DEWR 2022f). There are a suite of programs under Workforce Australia including the Employability Skills Training program that support people finding jobs and improve industry specific skills (DEWR 2023).
- The Skills Checkpoint for Older Workers program helps people aged 40 years and over who are employed or recently unemployed to get career advice and subsidised training (with reimbursements up to \$2200) (DEWR 2022c).⁸⁹

There may be underinvestment and barriers to lifelong learning

The wide-ranging benefits of lifelong learning mean that all parties — governments, businesses and individuals — should have an interest in supporting it.

While individuals contribute to the cost of adult training, most costs are borne by others. An adult learning survey found that 87% of people aged 15-74 completing work-related training in 2020-21 did not incur personal costs (ABS 2022g). Individuals often have many supports to pursue training either provided by government or paid for by employers. Nonetheless, higher proportions of people working in some industries report incurring personal costs for work-related training. For example, 19% of survey respondents working in the health care and social assistance industry said they incurred personal costs for training compared with 6% and 7% in the manufacturing and financial services sectors respectively (ABS 2022g). Moreover, 33% of people working in smaller firms (less than 20 employees) reported having personal costs for training as opposed to 6% in firms larger than 100 employees (ABS 2022g).

While businesses pay for a sizeable share of existing training, they arguably tend to underinvest in general and more transferrable skills as they face the risk that they will not recoup their investments in skills if their employees leave. There may also be more general spillovers from training that are not captured by the business or the employee if the skills accelerate innovation.

In 2020-21, 5% of Australians aged 15-74 wanted to take formal training in the preceding 12 months but were not able to (ABS 2022g). Similarly, 7% (down from 11% in 2016-17), wanted, but were unable to take non-formal courses (which can be both work related or for personal interest) (ABS 2022g). As people age, they are less likely to report barriers to learning. This may reflect a lack of demand for, or culture of, lifelong learning, as well as an increased ability to pay for any further study.




⁸⁹ Mid-Career Checkpoint, a separate program piloted in New South Wales, Victoria and Queensland ceased operation in December 2022. It gave participants customised skills and training plans and career advice, and access to a training incentive of up to \$3000 recommended by the training plan and targets skill gaps in the economy. This was available for people re-entering the workforce, carers returning to work, and workers at risk of unemployment (DEWR 2022e).

It is important to consider the barriers people face when seeking adult learning to inform whether and how government support should be provided. Those facing barriers to training most commonly reported insufficient time or financial barriers as the main obstacles. Barriers varied by age, gender, employment status, family structure, household income and relative socio-economic disadvantage (ABS 2022g). As household income increases, fewer people report financial barriers as hurdles, but a lack of time to undertake training becomes more important. More generally, people who were unemployed, single parents, or lived in more disadvantaged areas were more likely to report barriers to formal learning.

Governments can only act to address some of these barriers. In particular, they have limited ability to help those lacking the time to study as providing them with the equivalent of their wages would be fiscally untenable. While imperfect, increasing flexibility in course provision and accreditation pathways may help those facing time constraints. Reflecting these difficulties, current policies mostly create financial incentives to complete work-related training (box 3.6).

Some policy-relevant barriers and opportunities for reform remain. There may be underinvestment in lifelong learning, particularly for general skills and for low-income workers. The challenge for government is devising policy instruments that could address such under investment without crowding out investments that would be otherwise funded by businesses or people themselves. Policy in this space should aim to target barriers, bolster transferrable skills and support reskilling (figure 3.9).

Figure 3.9 – Lifelong learning policy should aim to be additional

Additionality is central to effective government policy in lifelong learning		
Targets barriers	General skills	Not crowding out
<p>Alleviates real barriers to uptake of further learning, like insufficient funds or time</p> 	<p>General and transferable skills are more likely to have positive spillovers</p> 	<p>Individuals and businesses who can pay for training privately to continue to do so</p> 

A consolidated effort to support lifelong learning

There are a myriad of programs and supports offered by Australian, State and Territory governments that target different subgroups, encourage or create awareness for pathways into learning in adulthood. Most either target financial barriers or help people who are unemployed, underemployed or out of the labour force train to improve their job prospects. But there are many policy overlaps and some gaps. Moreover, the number of options can be overwhelming and difficult to navigate and while some programs offer career advice and caseworkers to help navigate the policy tapestry, others, do not.

A consolidated and strategic approach to lifelong learning should focus on policies and incentives that target barriers to uptake. To achieve this governments should evaluate the effectiveness of supports available, as well as pilot new approaches to inform a strategic and prioritised policy program.⁹⁰

⁹⁰ The Tasmanian government has developed an Adult Learning Strategy for 2020-2023 which aims to expand literacy and numeracy programs; improve coordination of available services and the information available for learners; and, increase community engagement with adult learning through a variety of policy initiatives and supports (Tasmanian Government 2020).

Evaluate and assess effectiveness of financial supports

Some existing policies help those who are unemployed and outside the labour force to gain training and career advice while others, such as the Small Business Skills and Training Boost subsidise business training costs. These policies have eligibility criteria that create gaps at the margin and some overlaps (though often eligibility in one program can sensibly nullify eligibility in another – for example students funded by CSPs are not eligible for the self-education tax deduction).

There is little formal analysis of the success and additionality of financial and tax-based policies in Australia and overseas and so it is difficult to reform and prioritise policies to increase their effectiveness.

However, there are good grounds for some policy changes and instituting an evaluation program that aims to develop a consolidated and strategic approach to financial supports for lifelong learning, including rigorous assessment of any programs with major budgetary implications.

Incentivising individual investment in training through tax deduction

The self-education tax deduction provides incentives for lifelong learning but is too narrow in its current form. Reskilling in areas that do not relate to or increase income in one's *current* employment is not eligible for a deduction — this could include general skills such as digital skills.⁹¹ These constraints exist partly because it is easier to determine what skills are work-related, reducing the administrative burdens, and partially to avoid government paying for personal interest learning, which is less likely to create positive spillovers. Despite the relative complexity, broadening training to include reskilling efforts that may increase future income might be desirable (RUN sub. 154 pp. 4–5). For example, it may allow people to retrain before being made redundant reducing unemployment spells for people exiting declining industries.

It is difficult to define the boundaries for a greater capacity for self-education tax deductions. Avoiding fraudulent behaviour and maintaining the integrity of the tax system would be important considerations in designing this policy. Treasury has run a consultation process to assess broadening the deduction to reskilling efforts. They noted that identifying how a course links to an individual's future earning capacity is difficult in some circumstances but that one way of limiting the deduction is to courses recognised by regulatory bodies (Treasury 2020, p. 7).⁹² However, this approach may be overly limiting. There are many courses not provided by registered domestic providers that deliver useful forms of education, especially later in peoples' careers.

Some Australians have few resources to fund their training — such as unemployed people, those outside the labour force, and people earning low incomes. Existing programs target many of these groups (box 3.4), although there may be a gap in supporting the training of older lower-wage workers — including those who are standard contractors or working in the gig economy.

A new self-education tax deduction is of limited value to people on low incomes as they pay little or no tax. Not surprisingly, a Dutch study found that income tax deductions are usually taken up by higher earners with almost no take up by single people with relatively low incomes (van den Berge, Jongen and van der Wiel 2022). A voucher that funds low-wage workers to undertake training (including training that targets general skills and reskilling to shift across industries) overcomes the financial barriers better than any deduction. One voucher program in Victoria increased mature-age VET participation (though the magnitude of this effect depended on how many voucher recipients substituted away from fee-for-service VET) (Polidano, van de Ven and Voitchovsky 2021, pp. 1031–1033).

⁹¹ Expenses eligible for tax deductions are for training that either:

- maintain or improve the specific skills or knowledge you need to perform your current employment activities
- or are likely to result in, an increase in your income from your current employment activities.

⁹² That is, TEQSA, ASQA, the Victorian Registration and Qualifications Authority (VRQA) and the Western Australian Training Accreditation Council (TAC).

Targeting business co-investment in training

The yet-to-commence Skills and Training Boost (the Boost) is a potential mechanism for stimulating training in businesses, which requires co-investment through a 20% tax deduction. The Boost is a costly program (with an expected budgetary cost of about \$550 million over the forward estimates) (Commonwealth of Australia 2022a, p. 26). While targeting small businesses may increase additionality, there is still a substantial risk that considerable taxpayer funding will support activity that would otherwise have occurred. This means there is an imperative for rigorous evaluation of the *net* impacts of the Boost on valuable training.⁹³ A further challenge is that while a business tax deduction presents a convenient mechanism to incentivise training — especially as it requires co-investment from businesses — the policy is still limited to people who are employed and is likely to encourage training in skills that relate to employees' *current* jobs. This may limit the spillovers and potential additionality of such spending. Evaluating the Boost can help better understand whether to continue or adapt the program.

Increase accessibility, awareness, and flexibility of available options

Increasing access to lifelong learning involves tackling the financial and time barriers to study (but also ensuring that people know about available supports). For many, taking on any kind of training hinges on the flexibility of courses as time constraints present a central barrier. More flexibility, not only in the delivery of courses but also in transferability and recognition of skills acquired allows students to tailor study to their changing needs. Currently, there is a dizzying array of learning options — microcredentials, formal qualifications, informal courses, local and international options, work-experience opportunities, and internships among others — as well as a number of supports depending on individual circumstance. Increasing uptake might also rely on raising awareness of the pathways available, as well as the potential benefits of upskilling and reskilling to spur proactive action.

Flexibility in learning can be improved by broadening recognition of skill acquisition. Indeed, about half of employers used unaccredited training in 2021 (NCVER 2021a). One way to provide flexibility in learning pathways is to introduce more exit points in formal study which give students the option to get recognition for study they have completed even if their circumstances or career goals change (chapter 4). Another is by increasing the incidence and recognition and the benefit from completing microcredentials and more informal training options. Making publicly-funded universities' lecture materials available online can increase access to learning materials that can support informal learning and stimulate interest in subsequent formal education (chapter 4).

Recognition of prior learning can help students move through training pathways more easily. Some positive changes are in train. The 2019 Review of the AQF recommended that the framework be revised to encourage credit recognition within and across sectors. The key recommendations included simplifying the levels of the AQF to acknowledge different pathways; avoiding unnecessary hierarchical structures; and, developing guidelines for translating microcredential into credits for AQF qualifications (Noonan 2019, pp. 12–15).

Formal recognition of microcredentials is complex. Microcredentials cover different skills at various AQF levels and do not cohere to current bands (Noonan 2019, p. 58). Moreover, a central benefit to microcredentials is their ability to adapt to innovation quickly; this may be stifled by AQF requirements and added administrative burdens (Noonan 2019, p. 58). Other concerns include inconsistent quality and the associated risk to other qualifications recognised by the AQF (Noonan 2019, p. 58).

The National Microcredentials Framework was developed to provide an integrated approach for informal recognition of microcredentials, and to develop a microcredentials marketplace (DESE and PwC 2021, p. 6).

⁹³ Some interested parties are concerned that its effectiveness will not be apparent by the time it is scheduled to end in 2024 (BCA, sub. 181; MYOB, sub. 198).

MicroCred Seeker was launched in late 2022 and aims to provide consistency of information to enhance student choice and facilitate better recognition of microcredentials.

The Productivity Commission has previously noted that comparator websites need to be impartial, curate information to suit students with differing circumstances, continuously update and assess the information presented to minimise misleading consumers, and avoid oversimplifying (PC 2020c, p. 195). Informed choice requires support and good quality, complete, comparable and accessible information (PC 2020c, p. 195). While still in development, MicroCred Seeker does not provide complete information, not only because many providers are yet to upload their course offerings, but also because, currently, only TEQSA-registered providers are able to upload courses. While there may be an intention to expand this, such limited scope (which excludes not only international providers but, importantly, many domestic providers including those registered with ASQA) risks the website failing to achieve both of its aims — to provide clear information of available options, and a consistent format and language that enables better cross-accreditation.



Recommendation 8.8 **Consolidate support for lifelong learning**

The Australian Government should consolidate and examine the effectiveness and accessibility of available programs to support lifelong learning and to reduce gaps and increase uptake. In doing so, it should evaluate the effectiveness of targeted programs to inform and prioritise policies for a consolidated lifelong learning strategy by:

- trialling policies that target support at employed lower-income people, including vouchers for career planning and work-related upskilling and reskilling
- evaluating the incoming Skills and Training Boost to assess its effects on the uptake of additional overall training, the skills it develops, productivity, labour mobility, and the characteristics of the businesses most responsive to the measure. Government linked administrative datasets will be useful for such an evaluation but might need to be supplemented
- extending the existing capacity for self-education deductions to education that is likely to lead to additional income outside of the employee's existing employment. This change should be evaluated after a suitable period, and pursued subject to assurance that strong integrity measures can effectively reduce the risks of fraudulent claims
- examining the effectiveness of training programs delivered to people who are unemployed and those transitioning to work such as Employability Skills Training programs, particularly for people later in life.

Government should also increase the accessibility, flexibility, and coherence of available pathways by:

- extending income-contingent loans to more VET courses (recommendation 8.7)
- providing alternative exit opportunities through the provision of nested qualifications (recommendation 8.13)
- requiring publicly-funded universities to make their lecture materials available online, with consideration of extending this to some aspects of government-funded VET where that is practically feasible (recommendation 8.9)
- ensuring that the Australian Government's MicroCred Seeker extend beyond courses supplied by TEQSA-recognised providers to the VET sector and where possible, to other private and well-recognised domestic and international course offerings
- constraining regulations that make acquiring new skills and moving to new occupations overly onerous. Most particularly, through regular review of occupational licensing policies and addressing issues in scope of practice (reform directive 10).

4. Boosting learning outcomes for tertiary students

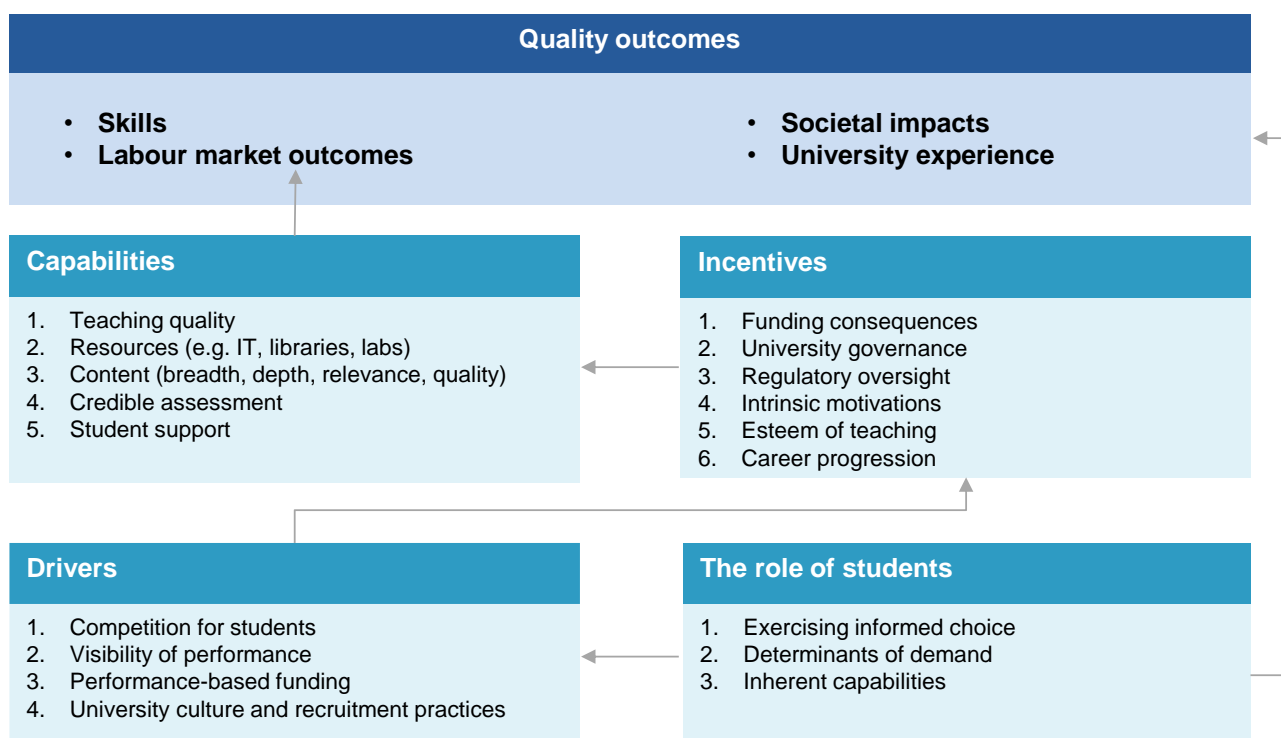
Key points

- ✳ **Getting the most from mass investment in post-secondary education will rely on lifting its quality, especially with the growing role of the sector in raising the skills of new generations of Australians.**
 - There are large variations in provider performance and a significant minority of higher education students do not rate their educational experience well.
 - Universities have weak financial incentives to raise their teaching quality and tend to favour research over teaching. Some non-financial factors counter these perverse incentives, but not by enough.
 - More needs to be done to promote quality teaching and leverage the opportunity presented by the shift to greater online delivery in recent decades, accelerated by COVID-19 pandemic restrictions.
- ✳ **Due to the variety of motivators at play, improving teaching requires a multi-pronged approach. The Australian Government should:**
 - bolster the visibility of teaching by requiring universities to share all lectures online and for free.
 - improve evidence and indicators of performance by: facilitating external teaching quality assurance; extending the evidence gathering role of the Australian Education Research Organisation to cover both vocational education and training (VET) and higher education; and, refining and validating quality indicators of tertiary education.
 - improve teaching prestige by funding research and innovation in teaching.
 - hold off implementing the proposed performance-based funding of universities, instead exploring the option of financial rewards to providers that have made successful efforts to improve their teaching quality.
- ✳ **Better student supports and guidance by universities would lower non-completion rates and avert the associated waste, loss of talent, and debt. The costs for those who exit can also be reduced.**
 - A new government grant program would help fund experimentation with new retention strategies.
 - Students who exit their university studies early are obliged to incur debt if they miss an obscurely-worded deadline. Making it clear what the deadline means would help students make informed decisions.
 - Providers should include at least one nested qualification in all bachelor's courses so that those exiting early could still meet criteria for a credential and have their prior learning more easily recognised if they choose to study later.
- ✳ **VET sector reforms currently underway will help secure its relevance, but rely on successful implementation, as well as prioritising cross-sectoral skills, prompt training package updates, supporting the VET workforce, and testing more flexible models of provision.**

The tertiary education sector’s contribution to productivity depends on the number of graduates and the quality and relevance of the skills they acquire. In turn, the sector’s capacity to deliver student outcomes depends on its capabilities and incentives, which are shaped by government funding and regulation (figure 4.1).

From a student’s perspective, a quality education includes course delivery (content, teaching, assessment, and student collaboration) and interactions with providers (faculty, student support services and university administration) that open up career opportunities and the capacity to contribute to society generally. Education is also a good in its own right. People value the networks and the campus experience, which, by stimulating demand, have an indirect effect on increasing skill levels and productivity in the economy.

Figure 4.1 – Delivering quality in tertiary education



While tertiary education providers perform well on many dimensions of quality (section 4.1), Australian governments have considerable scope to improve the functioning of the tertiary sector’s training role, a need accentuated by the increasing diversity among students, changes in modes of delivery, and rapid changes in skill needs. This chapter concentrates on two key policy dimensions of the learning experience:

- **teaching and course quality:** enhancing incentives to improve quality and relevance so that tertiary study yields more valuable skills (sections 4.2 and 4.3)
- **retention and completion:** ensuring the system provides quality supports for students struggling to complete their studies where retention is in their long-term interest, or where not, to facilitate early exit to limit waste of time and other resources (section 4.4).

This chapter gives less prominence to the policy issues in the VET sector, including those relating to quality and completions. This reflects that the Productivity Commission’s recent review of the National Agreement for Skills and Workforce Development (‘NASWD review’) identified a suite of reforms to improve VET quality, relating to student experience, course content, and course delivery (PC 2019a, chapters 6 and 7). Moreover, governments have commenced a VET reform agenda that is likely to make the VET sector more responsive to changing skill needs, more open to innovation, and shift it away from its prescriptive competency-based approach (discussed further in section 4.5). As a result, this chapter is focused on improving quality in the

higher education sector, particularly universities, which teach over 90% of higher education students, although issues relating to the VET sector are also raised, where relevant.

4.1 How big are the quality problems facing higher education?

As with schools (chapter 2), quality teaching is essential for getting the most from mass investment in post-secondary education for students and the community. There are multiple avenues for considering the quality of teaching delivered by tertiary education providers, which entail a hierarchy of indicators from the direct to the increasingly indirect:

- post-education outcomes for students in terms of skills acquired (say, the capability of treating cataracts or writing code to perform some computational task), lifetime employment outcomes, wages, job satisfaction, and the capacity to innovate and be creative
- inputs that are likely to affect those outcomes, such as teaching and course quality, and facilities (like laboratory equipment and access to academic journals)
- the extent to which tertiary institutions have the incentives to provide quality teaching.

Each indicator has its advantages. If it were possible to know the *causal* influence of higher education on outcomes with any assurance, then the first indicator would provide a good measure of the relative performance of institutions by subject area and time. It would also provide useful information to prospective students and a basis for performance-based funding.

However, even if causal effects could be measured, which is challenging (discussed in chapter 1 and appendix A), this provides little information about the ways in which an institution or the system could lift performance. Knowing the link between inputs and outputs helps make choices about investments in teacher quality and other supports.

Moreover, as teaching quality has many unobservable and subtle aspects, the financial and non-financial incentives for quality are central. That is, if universities and their teachers suffer no ill consequences from poor teaching, then it is less likely that teaching will be of high quality. In effect, the concern is that if mediocrity is cheap, then mediocrity will be abundant. Hence, it is important to assess the strength of the various financial or other incentives for teaching excellence. Changing these should be a key preoccupation of government policy.

Accordingly, gauging the ability of universities to improve people's skills should consider a suite of imperfect indicators.

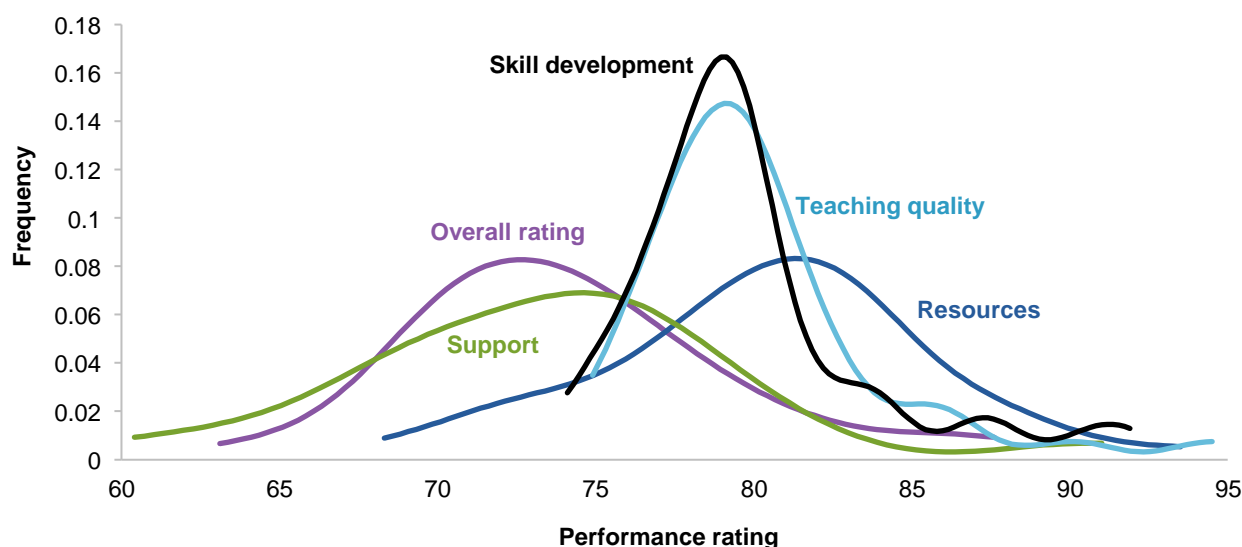
The outcomes from university training are generally high, but student perceptions are mixed

Over the medium term, university graduates have good labour market outcomes compared with those who acquire skills via VET or school alone (chapter 1 and appendix A). Graduates almost all participate in the labour market, having strong employment outcomes and low unemployment rates. They are likely to be in high-skill occupations and, associated with this, earn high wages. Employer satisfaction rates with graduates are high (chapter 1). While some of these outcomes could be determined by the inherent capabilities of those who attend university, the evidence still strongly supports a causal impact of attendance.

Nevertheless, the existence of these confounding factors, especially at the individual university level, makes attributing outcomes to the actions of any given university hard, and is a key challenge to workable performance-based funding (section 4.3).

There are no objective measures of the teaching performance of higher education providers or of the degree to which they raise skills, engage well with their students or provide adequate resources. Accordingly, student perceptions based on the Quality Indicators for Learning and Teaching (QILT) are used to assess performance along these dimensions, as imperfect as these are (appendix A and section 4.3). The picture is one of mixed performance, with outcomes in 2020 and 2021 particularly affected by the shift to online learning associated with COVID-19.

Figure 4.2 – Distribution of education quality across universities, 2021^a



a. The data relate to 42 universities with the performance rating densities estimated using a Gaussian kernel. The domains exclude learner engagement, which shows much greater variation in performance than shown here. However, regression analysis shows that learner engagement (which includes facets like feeling prepared for study, a sense of belonging to the university, and the nature and level of interaction with other students) has very little impact on students' overall rating of their university experience.

Source: Productivity Commission analysis based on SRC (2022c).

There are marked disparities in university performance on key domains of their educational functions, which is a major motivator for finding policy approaches that raise standards amongst 'laggards' (figure 4.2). The overall quality of teaching is the most influential explainer of the variations between students' perceptions of the overall quality of the entire educational experience, although student support and resources play a residual role.⁹⁴ Surprisingly, while students' *perceptions* of skill acquisition are linked to *perceived* overall teaching quality, the subjective assessments of teaching quality have weaker links to observed labour market outcomes. For instance, the medium-term full- and part-time employment outcomes of graduates do not vary much across universities (SRC 2022d, pp. 12–16).

⁹⁴ These results are based on analysis of student ratings across universities, and so seeks to explain the variations in the overall ratings at the university level. This analysis is relevant to any model of performance-based funding. Further analysis — not undertaken — could use student level data. This could inform the determinants of student ratings of their overall university experiences for each university and whether these were uniform across universities (which, given the nature of their student intakes and varying vocational orientation, is unlikely). This is a fruitful area for future analysis.

Providers have mixed incentives to invest in teaching quality

In most markets, providers are financially motivated to focus on quality where consumers value this. This dynamic is weakened in tertiary education for multiple reasons but not to the extent that some suggest.

The nature and funding of the ‘service’ limits conventional pressures for quality

Students do not know in advance how well a course is taught or whether it matches their specific interests and capacities, but have to wait until they have commenced — that is, any specific course is an ‘experience’ good (Quiggin 2016).⁹⁵ While this problem might be addressed by providing students with information, existing information lacks the required granularity to inform choices at that level. Higher education is not a single good, but a multiplicity of services provided simultaneously and sequentially by numerous institutions and staff. Even if there are some measures about the average teaching quality, that does not provide information about specific courses and the people who teach them. QILT only provides subject-area information and average provider quality measures, but, as discussed above, even this lacks much correspondence to the ultimate career outcomes.

Instead, student choice often relies on other aspects of the institution, such as a vague perception of overall quality or location. Most students expect to be able to physically attend university, and given the high cost of rent, often prefer to stay at their parental home, reducing their options to the few universities in their city. While there are many more VET providers in any major city, the VET system places little competitive pressure on higher education providers except for a very few vocationally-oriented courses.

Moreover, given that part of the benefit of education is its signalling value (chapter 1), reputation and prestige are likely to play a larger role in student choice than teaching quality. Indeed, the US experience suggests there is no evidence that learning quality determines an institution’s success in the marketplace. Instead the market favours selectivity, brand names, visibility and major research portfolios (Probert 2013).

Funding arrangements also affect competitive pressures. Fixed or capped fees for domestic undergraduate degrees (and some VET courses) reduce incentives for providers to compete on quality as there is no premium for doing so.⁹⁶ The majority of Commonwealth Grant Scheme (CGS) funding is block-based and capped, referencing each university’s historical level (chapter 3). This effectively sets a cap on student places for each university, which, given demographic pressures, will soon start to bind. So long as a university can attract enough students up to its cap at its existing course quality, it has no financial incentives to further improve quality. (The Productivity Commission’s recommended return to a demand-driven system (chapter 3) would ameliorate this problem.)

Moreover, the upfront price of university is low due to the Higher Education Loan Program (HELP), so the usual salience of prices for motivating careful choice is weakened.

The primacy of research may have some effects

The incentives to invest in quality teaching are weakened if teaching is regarded as a less prestigious and important role of university staff than academic research (PC 2017c, p. 13). International rankings play an

⁹⁵ In principle, so long as university places are not overly constrained, there can still be strong incentives for producers of experience goods to signal the quality of the product because if they can do so they can capture market share from competitors or expand the market. However, universities have little capacity to issue service warranties given the difficulty in objectively defining a defective service. The same problems affect the capacity of students to make use of the Australian Consumer Law or the common law.

⁹⁶ However, fees are not regulated for postgraduate courses and education provided to international students.

important role in attracting students, particularly international students, but all ranking systems give a disproportionate weight to research outputs and the fame of a few stars rather than teaching quality (Hou and Jacob 2017).⁹⁷ The Academic Ranking of World Universities (the Shanghai rating) includes no measure of teaching quality, with the rankings determined solely by prestigious prizes, citations, and publications in *Nature* and *Science*. In contrast, the Times Higher Education rankings give more weight to teaching quality, including through an academic teaching reputation survey, whose score contributes 15% to the rating. The other dominant ranking system — the QS World University Rankings — has no explicit ratings of teaching quality but uses faculty teacher ratios and employer reputation as elements of the rankings, which provides, at best, indirect measures of teaching performance.

The weight given to research capacity may not matter much if high research quality leads to high teaching quality, but the evidence for this link is tenuous (Cherastidtham, Sonnemann and Norton 2013). Indeed, across universities, QILT survey data suggests that for every 10 percentage point increase in the research-only share of academics in a university — a measure of their research orientation — students' teaching quality and skills development ratings *fall* by about 2 percentage points. (This explains about 30% of the variation in quality and skill development scores between universities). This may not reflect an adverse impact of research but may be attributable to other aspects of universities that tend incidentally to have a research focus (the Group of Eight predominate among research-oriented universities). However, the results do not support a positive nexus.

Notwithstanding the positive link between the teaching orientation of a university and students' ratings, commentators often cast a bleak light on the teaching role. Teachers may be stigmatised as 'not research-active' (Probert 2013, p. 4) or in need of relief from its burden:

... academics seek 'relief' from teaching in order to pursue research as they would take medication to relieve a headache. ... The situation is not helped when resources for teaching are continually squeezed and it can be exacerbated in mass systems that require academics to manage ever increasing numbers of students with changing and diverse needs, backgrounds and attitudes to study. At the same time, ever-higher levels of competition in research make it harder for researchers to devote scarce and valuable time to teaching. (Coaldrake and Stedman 2016, p. 96)

It is also easier for academics to signal their research capabilities, for example through successful grants, academic publications and citations. There are emerging ways for academics to demonstrate their teaching excellence, but they are recent (Olga Kozar 2021).

The internal labour structure of universities also suggests that research staff are given more primacy — having more secure employment and better career prospects. In 2021, about 70% of teaching only roles in Australian universities were casual.⁹⁸ This was only 6% for research-only academics and 2% for traditional teaching-and-research academics (DESE 2022e). While academics engaged in *both* teaching and research still account for the majority of teaching roles (63% in 2020), this share was higher in the early 2010s (at about 70%). By definition, teaching-only academics only teach, and so contribute far more to teaching hours (about 70%) than their teaching-and-research counterparts (NTEU, sub. 36, p. 3).

⁹⁷ Universities may mislead students in their use of such international indicators. In marketing its teaching quality, one prominent university indicated that it was first in Australia and 32nd in the world with the implication this related to teaching. However, those rankings had barely any link to teaching quality, but to a wide range of performance metrics that gave little weight to teaching. Using QILT measures, the university rated at the bottom or close to the bottom for all of the aspects relating to the student experience, such as teacher quality, skills development, and learning resources.

⁹⁸ Including full-time and fractional full-time. The share of staff employed on casual contracts does not account for an additional group that is employed on a sessional basis but counted among full-time (or fractional full-time) staff.

Does casualisation itself lead to worse teaching?

Putting aside the lower prestige that casualisation of teaching roles signals, its impact on teaching quality depends on its impact on attracting talented people to teaching roles and acquiring teaching skills.⁹⁹

On face value, the uncertainty of long-term job continuity and interruptions to employment during semester breaks make a casual teaching role unattractive. Contracts can be terminated with little notice. The vulnerability of such workers has been highlighted by widespread unlawful underpayment of casual academic staff (TEQSA 2022a) and the mass layoffs of them during the COVID-19 pandemic (DESE 2022e).

Nonetheless, several factors at least partly offset concerns about the effects of the precarious employment of teaching roles. For postgraduate students, casual teaching roles provide income while they study and, as such, a financial incentive to perform well to keep their jobs while training. Other non-pecuniary incentives to perform well are also at play — discussed below. And notwithstanding some of the negative aspects of the job, nearly 50% of casual sessional academic employees were employed for 6 years or more in 2019 (NTEU, sub. 36, attachment B, p. 6). This suggests some capacity for retention of a core group of staff to provide stability for students and to develop teaching capability.¹⁰⁰

Productivity Commission analysis of the NTEU and QILT data also suggests that casualisation of teaching-only roles does not appear to weaken undergraduates' perceptions of teacher quality. Based on QILT data, across universities, a ten percentage point increase in the casual share of teaching-only roles decreases student perceptions of teacher quality by about 0.4 percentage points, a tiny and imprecisely measured effect that is statistically indistinguishable from a zero or even positive impact. Casualisation has even smaller effects on perceived skills development.

Students have little recourse to independent complaint mechanisms

The capacity for 'customer' complaints can also provide incentives for quality. However, there are few powerful avenues for complaints by university students. The Tertiary Education Quality and Standards Agency (TEQSA) is not a complaints resolution body, and so only uses student complaints as background information to inform systemic assessment of providers' compliance (TEQSA 2022d). TEQSA takes a high-level view of providers, seeking to assure itself their internal institutional quality assurance arrangements are robust, effective and sustainable (TEQSA 2017b).

Universities have their own complaints handling processes and are given advice about how to manage these, but these are not independent from the university (ACTO, CO & OSO 2016). Very few complaints are lodged by students and most do not relate to teaching quality, but instead to appeals about grades, behavioural matters, and mental health. For example, notwithstanding the tens of thousands of enrolled students, the Australian National University recorded just 61 concerns about program, course or teaching quality in 2020 (ODS 2021, p. 46), which was a small fraction of total concerns and, given the QILT results, must only be a negligible share of dissatisfied students.

⁹⁹ While this chapter primarily relates to the higher education workforce, the teaching role in the VET sector has some other unique dimensions. In particular, given its job-ready focus, facilitating flexibility for individuals temporarily moving from industry into teaching, or to work part time in both, could be beneficial — particularly in VET, which works closely with industry to maintain relevance of skills (PC 2020c, p. 242).

¹⁰⁰ The ABS Census Longitudinal dataset between 2011 and 2016 indicates that 45% of tertiary education teachers in 2011 were still in this occupation in 2016 (though these values also include VET tertiary teachers). This is considerably lower than for school teachers and many other skilled occupation (such as trade and healthcare occupations), but greater than for the many unskilled occupations.

As tertiary education providers increasingly operate in a commercial environment, competing for students and marketing their services, they can more clearly be said to be ‘acting in trade or commerce’ and therefore subject to the provisions of the Australian Consumer Law (ACL) under the *Competition and Consumer Act 2010* (Cth). In principle, providers could be liable — on several grounds — to pay compensation for breaches of the ACL or for negligence (Cohen 2016; Corney & LindLawyers 2020; Coronas 2012; Goldacre 2013).

There has only been one notable case in Australia where a provider paid substantial costs for allegedly inadequate training. In 2022, the Box Hill Institute settled for \$33 million in a class action mounted by about 500 students undertaking an aviation Diploma (Preceel 2022). The class action was based on alleged failures of the Institute to guarantee the delivery of its services with ‘due care and skill’ and in a ‘manner fit for purpose’, and on claims that it had engaged in unconscionable conduct and misleading and deceptive conduct — all avenues for legal redress under the ACL. While a settlement provides no precedent value about which, if any, aspects of the ACL apply, a settlement would not have occurred if there was doubt about the capacity of the court to hear the matter. Nonetheless, unlike the competition regulator in the United Kingdom (Competition and Markets Authority 2015),¹⁰¹ the ACCC has not provided accessible explicit guidance to students and universities on the implications of the ACL.¹⁰²

Nevertheless, few consider that the consumer law provides substantive protection. Guidance and clarity on the application of the ACL would likely only partly ameliorate that.

Consequently, unless the problems were significant and systemic, universities and other educational providers have little legal ‘skin in the game’ in terms of penalties for poor teaching quality or student outcomes. So long as the student continues to study past the ‘census’ date (section 4.4), universities are fully paid for their services, even if their offerings are inadequate.

It is also unlikely that creating a specialised body to hear students’ individual complaints, like the UK Office of the Independent Adjudicator, would be worth the cost. The latter body covers all higher education students in England and Wales. The Office spends about \$10 million annually (in Australian dollars) and finalised about 2600 complaints in 2021 of which 43% were found not to be justified (OIA 2022, pp. 5, 11, 49). Only 3% of complaints were fully justified. Given the much smaller population of higher education students in Australia, the number of justified complaints would likely be very small were Australia to emulate the UK model. The most valuable aspect of such a body is that its existence alone may encourage universities to lift their performance, but this effect is unlikely to justify a new agency.

The Productivity Commission’s approach has accordingly given substantial weight to prevention of poor teaching rather than difficult-to-apply remedies after poor service.

Existing review processes set a weak floor on quality teaching

The Higher Education Standards Framework requires providers to undertake a comprehensive review of course delivery at least every seven years, supported by more frequent monitoring at a unit level. These review activities are expected to encompass external referencing against comparable courses (including student performance data) and incorporate student feedback. TEQSA (2017b, p. 3) notes ‘external referencing’ can take the form of benchmarking, moderation or peer review. While this approach is appropriate for risk-based regulation, it largely leaves each provider to manage quality assurance independently (alongside relevant professional bodies and any accrediting organisations). In practice, although providers have public institutional

¹⁰¹ A recent UK House of Commons Committee report into the deficiencies of online learning during the COVID-19 pandemic has made explicit students’ rights under the consumer law (HoC 2020, pp. 12–16).

¹⁰² Although, the Australian Government has made clear to international students that their rights are protected under consumer protection laws (Study Australia 2022).

review frameworks, the depth and impact of these internal reviews is not clear or likely to be consistent and does not serve as a useful basis for informing students or ‘disciplining’ providers.

However, there are powerful non-pecuniary incentives for quality teaching

While there are many incentives for universities to underplay their teaching role, there are other factors that suggest that universities and teachers have considerable interest in delivering quality, and evidence of their behaviours are consistent with this.

- Intrinsic motivations for excellence in any profession are often high, regardless of weak external pressures. And no one gets peer esteem from being known as a bad teacher.
- Early career STEM academics in teaching-only positions report the highest level of satisfaction with their workplace compared with teachers undertaking both teaching and research (Christian et al. 2021), which would tend to make teaching-only jobs a fulfilling option.
- Academia is a global industry, with many academics seeking jobs abroad in a highly competitive market. Adding teaching excellence (if it can be verified) to a research publication record improves job prospects.
- Academics looking for promotion domestically in research-teaching roles often need to demonstrate their teaching skill. For instance, teaching performance contributes 15% to the overall promotion assessment at the Australian National University. While this is not high, getting a poor assessment may well stymie career progression. As Melbourne University put it: ‘We want you to be research active and see no point whatsoever in teaching, said no academic job ad anywhere’ (ArtsUnimelb 2018). So while there may not be strong incentives for excellence, there are incentives to not be bad.
- Universities are making efforts to reward quality teaching and signal its value — through awards for excellence. Some universities have also developed capabilities to promote higher quality teaching. For example, in Melbourne University, there is a year-long program of support and professional development for teachers, the Curriculum Design Lab was created in the Faculty of Arts to support teaching innovation, while the Melbourne Centre for the Study of Higher Education has a repository of material for higher education teachers. These kinds of initiatives are still imperfect and ad hoc. For example, while universities are active in enrolling diverse student groups, there is evidence that their policies for genuine engagement are often more aspirational than substantive (Baker et al. 2022).
- Providers routinely and voluntarily use a range of approaches to evaluate and assist teaching performance — including student questionnaires, peer review and professional development. It is hard to reconcile the widespread use of these with a lack of interest in quality. For example, the Teaching Innovation Unit of the University of South Australia offers its teachers a 10-week blended course in teaching excellence and has several types of collegial peer reviews (‘Peer Partnerships’ and ‘Teaching Squares’) and a formal summative review process (UNISA 2023). A sample of other universities showed many had similar programs.

The growth in online learning poses challenges and opportunities

Online delivery is now a ubiquitous feature of higher education. Online learning has three broad formats. The most common and basic form — ‘Optional-online’ — gives students the *option* to miss in-person lessons and access them more conveniently at another time through recordings. The novel forms are ‘External-online’, with all learning and assessment online, and ‘Multi-modal’, which requires some in-person training or assessment, with the remainder being exclusively online.

Online delivery offers greater access for people who might otherwise be unable to take classes in person, such as people with childcare and work responsibilities or who are living in regional areas where there is no

physical campus (Stone 2017). It also expands options so that students living in one city can study in another, which may increase competitive pressures in this market segment. Online formats also enable uptake of innovative technologies to improve student learning, such as the use of virtual and augmented reality in health science instruction (Barteit et al. 2021; Canty et al. 2019; Chen et al. 2020), and more student control over classroom dynamics, such as more student-led interaction (Paul and Jefferson 2019).

Pandemic-related restrictions in 2020 accelerated the uptake of online delivery as in-person delivery was prohibited or discouraged.¹⁰³ In the VET sector, a smaller proportion of registered training organisations (RTOs) shifted to fully external learning and assessment, given requirements for face-to-face work placement. Still, many VET providers moved instruction to blended or external formats — the percentage of fully face-to-face providers fell from 49% to 18% during the pandemic (ASQA 2021).

This transition was not smooth, particularly in the higher education sector. The first year of the pandemic saw a spike in student complaints to TEQSA (TEQSA 2022b). A mid-2020 survey of 787 students at an Australian university reported that 75% of respondents found it more difficult to study online than in-person (Dodd et al. 2021). However, these problems will at least partly reflect that the sudden onset of the pandemic gave universities little time to plan for exclusive online delivery.

Putting aside these transitional problems, the effectiveness of online teaching and learning depends on the student, the course, the mode of delivery and the outcome being measured. A literature review of online learning in US college courses found that most students anticipate compromised learning in entirely online courses (Xu and Xu 2019, p. 29). However, these impressions do not appear to systematically translate to poorer academic performance. Multi-modal delivery saves time for students while yielding similar average academic performance as face-to-face delivery (Alpert, Couch and Harmon 2016; Bowen et al. 2013). The effect of the purely external format versus face-to-face delivery on student grades is more equivocal. In some studies, it fares worse than face-to-face delivery (Alpert, Couch and Harmon 2016; Figlio, Rush and Yin 2013) and some much the same (Paul and Jefferson 2019).

The effectiveness of online learning also depends on the level of investment by the institution. One possible reason for the mixed results of purely external delivery is that the quality varies greatly by provider.

At the top end, developments in online provision have the potential to increase the overall quality of tertiary teaching. These allow bundling in-person tuition with innovative digitally-supported instruction and integration of MOOCs from other institutions (for example Wang and Zhu 2019), while also providing a resource for professional development of teachers (Despujol, Castañeda and Turró 2022). Taking advantage of these developments requires universities to invest in complementary resources and staff with online expertise.

At the other end of the spectrum, learning could be worse if the online delivery simply reproduces in-class lectures, but with a less engaged lecturer and class. One subject at an Australian university offered 'online lectures' that consisted of the class slides accompanied by an automated voice program reading them. If providers view online delivery as a cost-saving device, allowing them to save on lecturer time, then quality is likely to fall.

The flexibility afforded by online learning also depends on educators making their courses accessible for those with disability, particularly the vision- and hearing-impaired (Pittman and Heiselt 2014; Prytz 2020). Regardless of the form of online provision, students without stable internet access or adequate technology

¹⁰³ The progressive expansion of online learning in Australia began long before the pandemic. Large private providers have emerged online, such as Coursera and edX, and universities have recognised the potential to scale up offerings through massive open online courses (MOOCs). In the years leading to the pandemic, about 30% of higher education enrolments were already external or multi modal (Lodge et al. 2022). The proportion of individual VET subjects delivered fully online grew from 6% to 13% between 2010 and 2017 (Griffin and Mihelic 2019, p. 10).

do not have an equivalent learning experience to their peers — a disparity the pandemic highlighted (Means and Neisler 2021). These are not reasons for reducing online delivery, but rather for improving digital services¹⁰⁴ and accounting for the need to vary how courses are delivered to students with diverse needs.

In-person teaching will return, as students value the ‘campus experience’ and the personal networks built with other students. But this will not crowd out ‘optional-online’ delivery, while external-online and to a lesser extent, multi-modal, delivery will wane in importance but persist, as will innovation in the use of these modes (Richard Caladine, sub. 113; Universities Australia, sub. 195). In a survey of VET providers, 62% of RTOs who moved instruction online stated they would use more blended learning in course delivery (ASQA 2021).

Where their pay structures do not already do this, allowances paid to teaching academics for professional development to acquire online skills and for the additional time to prepare innovative online content may be justified. There is some anecdotal evidence that as online delivery ramped up during the pandemic, academics’ workload substantially increased (Zhou and Tariq 2021). To sustain innovative online delivery in a post-pandemic world, these additional workloads may persist, especially for new academics without experience in online delivery. Failing to adequately remunerate teaching staff for the time to prepare quality online material would likely lead to lower quality online teaching.

4.2 Leveraging information to promote quality

Revealing the performance and content of teaching provides incentives for universities and teachers to improve, can facilitate peer learning, and in its own right serve to educate the wider community. However, existing approaches are out-of-date, and metrics that might guide students need further development.

Making the invisible visible

Most university lectures are now either posted or delivered online. This material is an under-exploited resource for students, peers and faculty leaders, and there are few reasons for its use to be confined to the students attending the specific class. Divulgence of the material to other students, peers and the public more generally has several social and economic advantages:

It encourages higher quality teaching — teachers can gain insights into the approaches taken by peers and will be motivated to improve their own teaching because it is more widely observable by students and their peers (including senior academics). In this respect, it has elements of formative assessment, but mediated by technology. In turn, academic leaders would have greater incentives to ensure adequate professional development as teaching quality would be more obvious to external parties.

It improves matching efficiency and empowers students — students contemplating a course could observe the difficulty and relevance of the content and the pedagogical style of the teacher to see if it suited their needs, while also giving them insights into quality. In effect, it would be a ‘try before you buy’ option that would partly address the fact that a university education is an experience good. It would be a complement to information provided through QILT and other quality measures. The approach is consistent with the general shift toward a consumer-centric focus by government-funded and regulated services — which recognises that services should accommodate people’s different preferences and capabilities and help them make choices. In turn, the revealed preferences of students would strengthen faculties’ incentives to adapt their approaches to professional development, appointment of tertiary teachers, teaching and support.

¹⁰⁴ As discussed further in this inquiry’s companion volume ‘Australia’s data and digital dividend’.

It assists in lifelong learning — for people who do not want to or cannot afford to go to university, and who do not need accreditation. Open access would pull into the system a new group of students consuming virtual lectures at zero cost but, as noted below, without cannibalising university revenues. At no budgetary cost, this would stimulate skill acquisition and productivity, especially for older people already in jobs for whom the cost of a university education is less likely to be deferred (as HELP loans would be immediately repayable if income thresholds were exceeded).

There are several choices about who could get access to the material and the extent of divulgence.

In a completely open model, all online lectures would be available for free to anyone — student or not. Free provision is consistent with large public subsidies given to higher education and the non-rivalrous nature of ideas (one person's consumption of an online resource does not reduce the capacity of anyone else to consume it). The same principle underpins the requirement that research funded by government be shared openly (for example, as in the NHMRC's and ARC's Open Access Policy), so extension to lectures is a logical progression. An open model would assist all teachers and all would-be students regardless of the institution because it would demonstrate excellence in teaching across all of them.

Universities may have some concerns that an open model would reduce their income from fee-based online courses, and in particular from the international student online market. Income losses would be a risk if prospective students could consume course material for free and sidestep universities via some other reputable method for accreditation. That seems doubtful on several grounds. First, there are very limited options for accreditation outside universities, which is an essential and exclusive function of universities. Second, the university experience goes beyond the material presented in classes and includes assessment and feedback, individual interactions between students and staff, and (for in-person students) the amenities and experiences of university. It is notable that one of the world's best universities, the Massachusetts Institute of Technology (MIT), has made all its lectures available online for many years.¹⁰⁵ There is little evidence that free courses undermine enrolments in fee-based courses (for example, Johansen 2009), and indeed, they may increase enrolments if the university demonstrates its quality.

Universities may claim that the material is their Intellectual Property (IP). Resistance to change based on that claim ignores that government is an implicit shareholder in universities and could quite reasonably seek to maximise the public returns of the investments it makes (noting that reverting to a demand-driven system will further expand the Australian Government's stake in the sector). But any class content drawn from another IP source (such as MOOCs) should not be included.

Concerns about student privacy (for example, where they give presentations in class) can also be averted by seeking consent for the inclusion of their material or for selective publication of the lecture.

There are accordingly strong grounds for universities to be required to provide their lectures online to the public on an open-source basis, but with no requirement that the universities accredit any training. The requirement would be for the most simple least cost way of presenting the information.

An inferior option, but that would still improve teacher quality and assist informed choice by students, would be online divulgence of a few randomly selected lectures of any given course to all students and teaching peers in a university.

¹⁰⁵ MIT highlights the benefits of its long-running open access provision of thousands of MIT courses for improving teaching quality and supporting lifelong learning (MIT 2023).

Strengthening performance measures

Information about the quality of higher education providers' teaching may improve performance through three primary avenues. Higher performance ratings may increase student demand and revenue, which creates financial incentives for universities to improve their performance if they can divert students from competitors, or, in a demand-driven system, attract new students. Moreover, universities themselves may respond to benchmark data to the extent that their relative status is a motivator for performance. The regulator, TEQSA, may also use indicators of lacklustre performance for investigations of quality.

The capacity for metrics to have these effects depends on many criteria: Do students use ratings, and if so, in an informed way? Is the data readily accessible? Do ratings meaningfully and accurately measure what matters to students, government and the community generally? Does demand respond to ratings and do universities attempt to increase their performance if their ratings are poor? Do they succeed? No comprehensive assessment has been made of existing metrics based on the above criteria and doing so is best achieved by giving that task to the Australian Education Research Organisation (AERO) (as discussed below). However, the Productivity Commission has assessed the available metrics against some of the key criteria.

Current performance metrics could be improved ...

The dominant Australian performance measurement framework draws on QILT, which has strong *face* validity. It is similar in aspiration and design to the UK's National Student Survey, but more comprehensive. It covers most of the domains that are relevant to students — skill development, engagement, resources and teacher quality (appendix A). Survey responses are, by contemporary standards, high at about 40% for the Student Experience Survey module (SRC 2022b, p. 2). QILT follows students after they graduate, measuring labour market outcomes, employer satisfaction and whether skills acquired in training are used. There is also relative stability in university ratings over time, which suggests some degree of reliability.¹⁰⁶ Stable results are necessary if ratings are to inform the choices of prospective students.

However, QILT has several deficiencies when evaluated against standard criteria for any performance assessment tool — accuracy, precision, reliability and validity (AERA, APA & NCME 2014). The validity of QILT — the extent to which it measures what is intended — is of particular concern. For example, it does not predict labour market outcomes well (appendix A). A large-scale meta-analysis of the connection between student evaluation and student learning found no robust correspondence (Uttl, White and Gonzalez 2017).

In principle, another deficiency of QILT is that it is implemented at the overall field of study level for each institution, and so does not provide information about how individual components are delivered or of the performance of any of the many teachers engaged in providing the training. However, overcoming that flaw would need to address the significant problems associated with student assessments of individual classes and teachers. The evidence suggests that student ratings of teaching quality are systematically biased indicators, for example being biased against teachers who are female, ethnic minorities, or not from an English-speaking background — or reflect dissatisfaction with a bad grade (Boring and Ottoboni 2016;

¹⁰⁶ On many important metrics of performance, the correlation between an initial year's scores and the next year is well above 0.8 (the threshold for good reliability) and typically decays slowly for future years. For instance, using the share of students who say teaching quality is excellent, the correlation between 2017 and 2018 scores is 0.95, and only falls to 0.86 between 2017 and 2021. Accordingly, *to the extent that the metric is valid*, 2017 score results would generally have helped students make an informed choice for attending a university in the years 2018 to 2021. However, analysis of the QILT data shows that rankings are less reliable and so should not be used as measures of prospective university performance. This has also been found for the various global rankings of universities. These results are based on Commission analysis of unpublished QILT data on shares of students rating teaching quality as poor and excellent from 2017 to 2021.

Kreitzer and Sweet-Cushman 2022; Stroebe 2020). Students claim to have learned more when they are given cookies or chocolate in class (Hessler et al. 2018; Youmans and Jee 2007). Moreover, student evaluations, even if using a valid instrument, suffer from high levels of inaccuracy: teachers are frequently rated by students as poor when they are good (a false positive), or rated as good when they are poor in achieving good learning outcomes for students (Esarey and Valdes 2020).

Overall, all assessment tools have shortcomings, and even if QILT is not a perfect way of assessing a provider's performance, providers with lower ratings across a range of dimensions could treat these as red flags for further investigation, as could students considering their choice of provider. It is also notable that there are some fields where there are consistently low performance scores across all universities *and* with particularly large deviations between them.¹⁰⁷ This suggests possible attention to the teaching of some fields more generally. The problems of survey bias and high false positives and negatives are greatest if test results are used for assessing individual teachers, but as QILT is published at the field and institutional level, inaccuracy is reduced through averaging, while bias is not such a problem if it is common across institutions. Furthermore, as QILT relates to the overall experience of the student rather than an average of their class evaluations, it may be less affected by the biases of individual class evaluations described above.

There is scope for refining QILT by:

- periodically re-validating the survey instrument. This would be achieved by surveying a sample of classes using the existing QILT survey and an appropriate range of new questions that also probe quality and then identifying the questions (and their weights) that lead to the greatest correspondence to a 'gold standard' measure of performance as given by independent expert assessment of quality. This is the usual approach for creating and validating psychometric and other similar screens. This could bring QILT results into closer alignment with expert assessment, which given its costs, can only be sparingly applied.
- linking QILT to administrative data to provide a more comprehensive measure of employment outcomes over longer periods to supplement survey data on graduate outcomes.

Refinement should only go so far. In principle, it would be desirable for QILT to measure the value-added of higher education providers by controlling for student characteristics and other factors that might confound the links between teaching quality and outcomes. If feasible this would isolate the *causal* effect of provider quality on students' experiences, their dropout rates, and their acquired knowledge, skills, work-readiness and personal development (York, Gibson and Rankin 2019). However, attempts to measure learning gain have generally stalled or been abandoned due to methodological flaws and high costs. The OECD ceased work on the Assessment of Higher Education Learning Outcomes project (colloquially referred to as 'higher education PISA') after governments withdrew support; the UK Office for Students has no further research into learning gain planned after reports highlighted methodological issues; and Australian Government plans to use the Collegiate Learning Assessment were dropped a decade ago (Coaldrake and Stedman 2016; Office for Students 2018a). Coaldrake and Stedman (2016, p. 99) observed:

Unfortunately in practice we do not have standardised definitions of what students are supposed to learn (and with constant changes in knowledge this is not a bug, it is a feature) and disentangling the various factors that influence student learning is a formidable task. As a consequence, we have to weigh very carefully the costs and benefits of seeking inevitably imperfect answers.

The academic who oversaw the UK's 'Learning gain pilot project' commented more pithily that learning gain is 'Like dark matter, we know it's out there, we just could not pin it down' (Kandiko Howson 2022).

¹⁰⁷ Based on QILT data for 2022 extracted from the Good Universities Guide.

... and dissemination to students enhanced ...

Regardless of the quality of any information on comparative provider performance, students need to be able to access the information, interpret it well and use it to inform their choice about a provider or course. The task for students is hard because of the confusing and contradictory set of performance measures promoted by universities, various global rankings, and media. A major stumbling block is that all of the material is curated by third parties who do not know what any given student expects from a course or subject (unlike open source lectures, discussed above, which could provide a more direct line of sight).

The global and Australian evidence shows that university ranking and other third-party performance measures have a mixed impact on students' choices. For example, in the United Kingdom, only 23% of university applicants in 2019 reported awareness of the Teaching Excellence Framework — a rating of higher education providers' teaching — and less than half of them used the ratings to inform their choice of provider (DfE and UCAS 2021). A Canadian study found students rarely consulted ranking publications, basing choice on information from peers and family (Milian and Rizk 2018).

The implication is that government and providers should raise student awareness of resources that can inform better choices. For example, resources could be included prominently in career guidance and at the time students enter their course preferences as part of the Universities Admissions Centre application process. The Australian Government has taken steps to enhance informed decision making. Some of the detailed data from QILT is accessible to prospective students through the ComparED website, which allows potential students to search for a subject area, find all providers offering courses in that area, and view summarised QILT measures.¹⁰⁸

However, ComparED enters a crowded space and competes with some other non-government-funded sources of information (such as the Good Universities Guide — the GUG). The GUG publishes material on course availability and content, costs, careers, scholarships, open days, and a key set of QILT indicators. In comparison, ComparED publishes a slightly more comprehensive set of QILT data, but does not provide any broader information about providers.

Moreover, the guidance to students provided by ComparED may be misunderstood. For example, a person wanting to know where to study applied econometrics will find high student satisfaction rates in non-universities such as the Christian Heritage College (89%) and the Australian College of Physical Education (88%). These are not the best places for obtaining the relevant skills compared with alternatives, such as the notionally lowly-rated University of Melbourne (50%). The key problem is that the same satisfaction rates are provided for all of the subjects in a broader study area (like business and management studies), rather than shedding light on the capabilities of the provider in the specific areas of study of interest to students. Business and management studies can include subjects as disparate and unrelated as actuarial studies, sports administration and advertising and marketing communication.

ComparED should be adapted to address its ambiguous reporting. However, an alternative option would be to support the incorporation of the more comprehensive QILT data from ComparED into the GUG or other non-government guides given their broad coverage of many other facets of providers relevant to informed student decisions.

Some suggest displaying a single star rating prominently alongside qualification materials and at key decision points to inform a wider base of potential students and to simplify choices. However, the more complex a

¹⁰⁸ There are some parallel issues for the VET system, previously highlighted by the Commission (PC 2020c, p. 211). The study recommended addressing gaps in the availability of RTO-level information, including quality measures such as graduate outcomes, student and employer satisfaction, and indicators of teaching quality. Reforms are underway.

service, the less meaningful are single simple metrics. A single star rating fails to consider the multiple domains of performance that students care about, while applying fixed (and arbitrary) weights to multiple domains ignores the variations in student preferences about them. Moreover, providers offer thousands of courses across hundreds of subjects. This variety is too great to realistically and reliably use survey data to assess performance. Yet students are interested in the area of proposed study, not averages across unrelated areas. In any case, the methodological problems affecting QILT cast doubt on the validity of star ratings, a point also raised by participants in the Productivity Commission's roundtable on tertiary education.

... but ratings alone are not a strong motivator for improvement

Universities make some use of ratings. For example, good ratings are sometimes actively marketed to attract students and ongoing poor student ratings of given courses will typically trigger some response. However, the key question is whether universities improve their outcomes individually and whether there is some convergence among them as 'laggard' universities seek to catch up to top performers. The more that low QILT scores motivate university management in their own right to improve their performance (the 'shame' factor), the more that scores should converge between universities.

However, there is no evidence of strong convergence in performance across most of the dimensions of teaching performance, such as overall satisfaction, teacher quality, course relevance, and intellectual stimulation of students.¹⁰⁹ From 2017 to 2021, most higher-performing universities remained top-performers, while most lower-performing universities stayed in the bottom part of the distribution (figure 4.3).¹¹⁰

Drilling down to the level of the teacher and the lecture room

QILT does not seek information on the performance of any given teacher, which is the level where behavioural change is most desirable. Instead, higher education providers seek information on individual teacher performance through their own student evaluation surveys. Low student response rates often affect their usefulness for feedback to teachers and faculty leaders. This also means that the results are too unreliable to release to prospective students and, given non-uniformity in survey questionnaires across providers, such information cannot be used to compare teaching outcomes across them. They are also afflicted by all the concerns raised above about the bias, validity and accuracy of student evaluations, and to a greater extent than QILT because results are not averaged. The greatest value of student evaluations may be as a screening test for subsequent, more accurate review by colleagues or in promoting critical self-reflection, rather than as a basis for 'disciplining' notionally poor teachers.

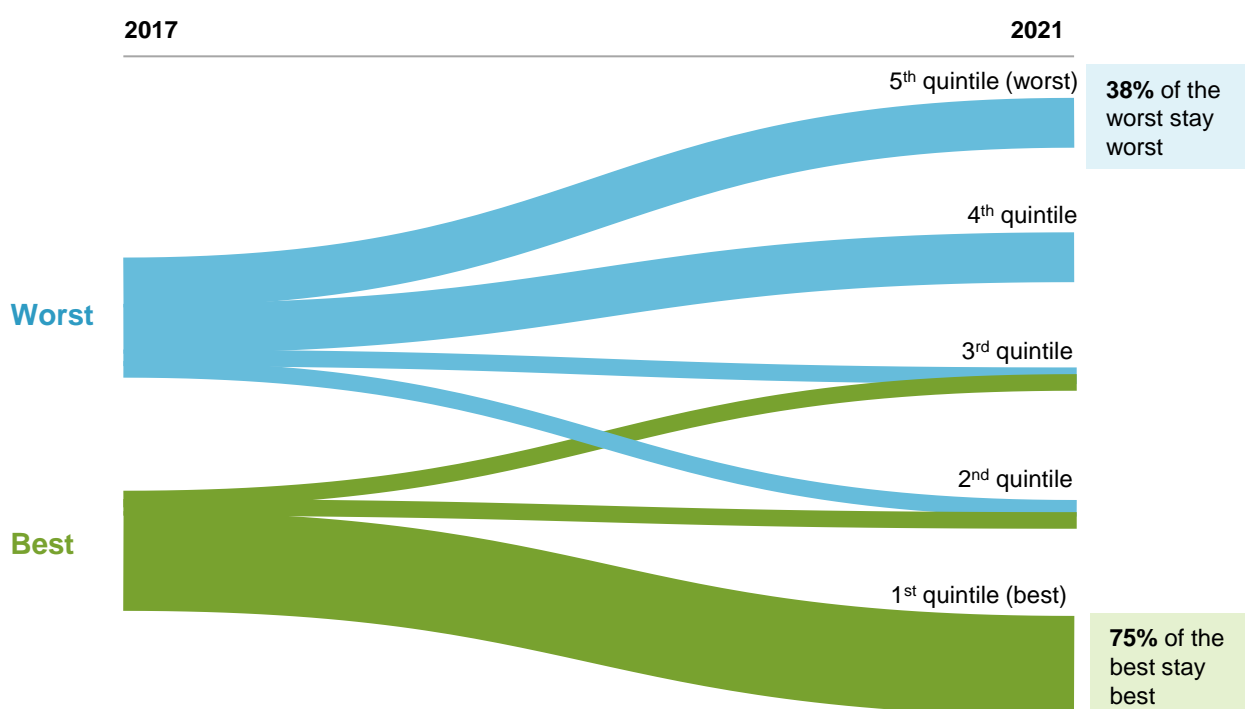
There are alternatives to student appraisal that provide better insights into individual teacher and departmental teaching quality. In particular, direct observation of the performance of teachers by their peers or by external independent parties can avoid some of the biases that arise from surveys and the risks that students respond to irrelevant aspects of course delivery (the 'chocolate cookie' effect) or those with poor grades mark down their teachers. When accompanied by training of assessors, direct observation allows the consistent and considered application of a common assessment framework.

¹⁰⁹ Convergence is measured by so-called σ -convergence which is the trend in the coefficient of variation (or the standard deviation divided by the mean) across ratings by university from 2017 to 2021.

¹¹⁰ On the positive side, the share of students who rated teaching quality as 'poor' fell from 2017 to 2021 for 80% of universities, albeit by a small amount (mostly by about 0.2 to 0.3 percentage points from base levels of about 3.5%). Equally, most universities (almost 70%) demonstrated an increase in the share of students rating teaching quality as 'excellent', although again by a relatively small margin compared with base levels.

Figure 4.3 – The good stay good, the mediocre stay mediocre^a

Universities with the highest and lowest shares of students saying overall quality is 'excellent' 2017 to 2021



a. In the QILT survey, overall university satisfaction can be classified as 'poor', 'fair', 'good' or 'excellent'. Considering only the distribution of the share students responding 'excellent' — the 'worst' universities are those with the lowest share of students (20th percentile and lower) saying overall university satisfaction levels are 'excellent' in 2017, while the 'best' include universities that have the highest share of students (80th percentile and higher) saying that overall university satisfaction is 'excellent' in 2017.

Source: Productivity Commission analysis of unpublished QILT data.

Peer review comes in many flavours — different methods, assessors and purposes (Johnston, Baik and Chester 2022). For instance, formative peer review relies on observation and appraisal of teacher practices by colleagues, and diffusion of best practice among them. Formative assessment has the value that both the reviewer and the reviewed benefit from the process (WSU 2020, p. 13). It is more closely related to coaching. In contrast, summative review is undertaken by an external party or a senior academic, often as part of a process for determining ongoing employment or promotion, although it too may have formative elements. Summative review may prompt improvement in teaching to avoid the consequences of an adverse review but is non-co-operative by nature and risks greater resistance by academics than co-operative models. Some universities have ceased summative assessment, such as the University of New South Wales (UNSW 2023).

Many Australian universities have active formative assessment peer reviews, although it appears these can be voluntary and vary in their rigor. There are grounds for an agency (discussed further below) to undertake a rapid review of the use of formative and summative review processes in higher education institutions and to encourage their development where needed.

While peer review is often an internal matter, there is also scope for complementary centralised reviews undertaken by a single agency. Such reviews can provide comparable indicators across different providers and subjects, and avoid any collegiate bias in assessments at the departmental level. However, full subject-level review is costly and administratively burdensome, requiring experts in each field and significant time. A program in England during the 1990s proved costly and may have been gamed (box 4.1).

Box 4.1 – Case study: England’s comprehensive subject review

The most comprehensive higher education subject review ran from 1993 to 2001 in England and Northern Ireland. The Quality Assurance Agency for Higher Education conducted subject-level reviews encompassing ‘sub-degrees’ to PhDs, and covered all departments at all higher education providers. Its two main goals were to ensure that teaching in the sector was of a satisfactory quality and to encourage further improvements. It did so by tying review results to funding outcomes.

Subject reviews were conducted by teams of at least three subject specialists and a review chair. Subject specialists were largely academics, although in some cases industry professionals were also included. All specialists received training before site visits. These visits lasted three to four days, and included meetings with subject staff, students, graduates and employers. They also included observing teaching and learning and reviewing samples of assessed student work.

Over its seven cycles, 2904 review reports were published. If a department received any inadequate grades, its subjects would be re-reviewed within a year. A further low grade at re-review could result in the partial or complete withdrawal of funding. Over its lifetime ‘the overwhelming majority (99%) of subject review visits resulted in the provision being approved in the first instance’ (p. 4). There was only one instance of a failed re-review (QAA 2003). Where there was improvement in outcomes, it was difficult to determine whether this reflected genuine quality improvement or learning to game the system (Cook, Butcher and Raeside 2007).

The program was replaced with a lighter-touch system in the early 2000s, owing in part to its public cost and the overhead burden to institutions. The ‘institutional audit’ system disentangled review from funding under the assumption that the comprehensive review program had made institutions’ internal quality assurance procedures more robust and hence more appropriate for the government to rely on. The institutional audit system was itself replaced in 2011. Quality assurance processes in England underwent several changes with the regulatory power of the Quality Assurance Agency diminishing over time.

Lighter-touch assessments of quality at the provider rather than course level are more attractive. For example, in Scotland, a central agency appoints a team of staff and students to review a subset of providers on a five-yearly basis. The review’s primary focus is whether the institution as a whole has effective arrangements for ‘enhancing the quality of the student learning experience and for securing the academic standards of its awards’ (QAA Scotland 2017, p. 14). The team determines this through meetings with staff and students. Individual review outcome reports are published along with thematic reports that collate findings from each review cycle about industry-wide trends and areas for development. Each institution must report a year later on how recommendations have been implemented.

The Australian Government should consider emulating these lighter touch approaches to spur continuous improvement across the sector, although the exact design of the arrangements would need to consider:

- the **type and depth of assessment** needed to effectively appraise teaching. For example, a centralised mechanism could involve observation, interviews, sampling of exam papers or external assessment of students
- the **unit of assessment**. For example, review at a subject level is likely to be most useful, particularly given the trend of providers allowing students to stack subjects to build their own degrees. However, this is also likely to be more costly
- **administrative burdens** on already encumbered teaching staff. Rolling or randomised targeting of specific institutions or subjects each year would reduce burdens by limiting the frequency with which a given faculty or

school is reviewed (for example, to every 5–10 years). Limiting the depth of reviews by taking sub-samples of assessments or externally assessing smaller random samples of students would also lower costs

- **the dangers of biased assessments.** A process for peer review of exams or assessments could be based on the double-blind approach used for research review to eliminate bias (although full anonymity may be challenging for smaller fields of study)
- **who undertakes assessments,** including the roles for academics, industry experts and students in supporting the assessment process
- **the consequences where teaching quality is found to be poor.** This could include requirements to initiate processes to remedy faults with re-assessment after an agreed period or, in extreme cases, the removal of course accreditation by TEQSA.

While TEQSA's current role is ensuring minimum standards, its remit (and funding) should be expanded to oversight these review processes, giving it a more active role in improving quality even among higher performers.



Recommendation 8.9

Leverage information to improve quality

The Australian Government should:

- increase the transparency of teaching performance by requiring universities to provide all lectures online and for free
- refine and validate new Quality Indicators for Learning and Teaching (QILT), and use these and other data to develop and publish more meaningful indicators of tertiary teaching quality and performance
- adapt the ComparED tool to address the risk that students may misunderstand its information and consider the option of abandoning it and providing additional QILT data to non-government funded websites that cover many other aspects of higher education providers relevant to student choice
- give the Tertiary Education Quality and Standards Agency (TEQSA) the responsibility to undertake external university teaching quality assurance review processes akin to those applied by the Quality Assurance Agency (Scotland).

4.3 Rewarding and spreading best practice teaching

There is little evidence that the higher education system is *systematically* failing to provide adequate training, but equally, universities and their staff have mixed incentives to perform their teaching function well and a significant minority of students say that many aspects of their training are only of poor or mediocre quality (appendix A). Given the pre-eminent and increasing role of higher education in raising the skills of new generations of Australians, improving the effectiveness of teachers in imparting skills has high potential productivity and social benefits (chapter 1).

Professionalising the tertiary workforce

School teachers are required to undertake years of training and professional development, and are supported by a range of institutions to fulfill their professional role. Professionalising the teaching role in tertiary education is, by contrast, in its infancy. Notwithstanding that higher education providers implement various strategies to improve teaching and promote collaborative peer review, there is uncertainty about the sophistication and resourcing of these strategies and the extent of take up by teachers. At least a few years

ago, the answer was not much (Norton, Sonnemann and Cherastidtham 2013). While comparable contemporary data are not available, other survey evidence suggests that higher education teachers do not get strong support in any of their functions (Christian et al. 2021).

Enhance capabilities

One avenue is to strengthen the capabilities of universities in offering support. Establishing a trusted evidence base about how to support high quality teaching and diffusing its lessons is one step (recommendations 8.9 and 8.11), as would be greater recognition of the value of the best teachers. Moreover, TEQSA should assess whether universities are making sufficient investments in the creation and use of, high quality, tailored professional development courses and materials for supporting teaching excellence, and if not, engage with universities to ensure this occurs, with encouragement of a collaborative approach between universities. AERO would contribute advice about what constitutes quality material (as discussed further below).

Research funding rewards for excellent teachers

Rewards, whether pecuniary or not, create incentives to perform better. But the form of the 'carrot' matters.

Notwithstanding enduring controversy over its effectiveness, there is at least *some* evidence from comprehensive meta-analysis that performance-based salary bonuses in school settings can improve outcomes, although its cost effectiveness and impact on student outcomes is context-dependent (Pham, Nguyen and Springer 2021).

However, there is no evidence base to assess the likely impact in a higher education setting, which, in any case, involves some additional complexities compared with schools. In particular, while quality school teaching is also hard to define, there is a greater capacity to monitor teacher practices and outcomes through standardised tests, which provide a more reliable benchmark for comparing performance. The problems plaguing student evaluation tests and the absence of standardised tests amplifies the difficulties of bonuses in higher education. *At this stage*, it would be risky for the Australian Government to fund or require performance-based pay for higher education teachers. This is especially so given that one of the most prospective avenues for raising teacher quality in higher education is the greater use of formative and peer assessment, which is based on co-operation rather than competition between educators.

Nevertheless, a different type of carrot may prompt improvements without the problems of pay bonuses. Awards for excellence are one, and have a strong evidence backing for their effectiveness (Frey and Gallus 2017a, 2017b). They can reinforce intrinsic motivations, encourage loyalty to the mission of the organisation, and can have bigger effects on performance than pay increases when the recipient's performance is hard to accurately monitor (though to work well, there has to be integrity to the process of bestowing the award to reduce debates about the merits of the choices). Standard academic awards are commonly used throughout the sector. Their profile and impact would be raised if they were used as a source of evidence for best practice (recommendation 8.11) and potentially, if more of them were given.¹¹¹

Linking awards to modest research funding for the award winner also looks to be a promising additional incentive. The Griffith Business School developed a Teaching Excellence Recognition Scheme (TERS) in 2014 that was explicitly designed to strengthen incentives for academics to invest in teaching (Berry and Guest 2018). Under this scheme, staff are recognised for their teaching excellence (drawing on a range of measures including student assessment, participation in peer evaluation, demonstrated innovation in teaching, and professional development among others) and then given funding for academic purposes (such

¹¹¹ One academic noted that in his institution, about one quarter of staff showed high levels of teaching performance, but at the rate at which awards were given out, might have to wait up to 25 years to be recognised (Berry and Guest 2018).

as for research or development of training resources). The scheme provides modest funding for a few candidates rather than providing a single ‘winner takes all’ prize, so motivating performance across most staff. A unique benefit of this model is that it combines the prestige of research with the teaching function. Canada has a range of small grants, which vary in their generosity and eligibility, but have similar features and aspirations to the TERS. The evidence suggests that the grants enhance the skills of recipients and lead to high-quality research (Hum, Amundsen and Emmioglu 2015).

There are compelling grounds for wider adoption of such micro-grants.

A new short-term grant to promote primary research into teaching

ARC grants usually provide for three to five years of funding for eligible projects, which is not suited to exploratory and short-term research into academic teaching excellence.

Accordingly, a complementary approach would be to create a modestly funded competitive grants scheme for shorter term projects of 6 months to one year into teaching excellence that academics could slot into their career plans without long commitments to research in this area. Such grants would necessarily involve less compliance burden than existing grants to justify the application costs for academics. A sequence of short-term grants for research by different scholars into teaching excellence would provide for the development of a body of evidence about teaching skills and the likely enhancement of the teaching skills of the researchers themselves. The evidence from an increasingly large group of researchers would feed into the relevant institutions’ practices and would also be disseminated by AERO (recommendation 8.11).

A prime benefit of such an initiative would be to help professionalise teaching as a function in a university as professions are typically characterised by the acquisition and application of expert skills, and such research would establish and legitimise the relevant skills. Success in competitive grants confers prestige on both the researcher and on the area subject to research. This halo effect would be amplified because universities tend to compete on their success in receiving ARC grants more generally, and so their relative success for this tranche of grants would also be a signal of their capability in this area of expertise.

The modest funding required for such grants could either come from the existing ARC funding pool or be supplementary, depending on government budget constraints. Given its novelty, a trial would be prudent.



Recommendation 8.10 Professionalise the teaching role

The Australian Government should bolster the incentives for, and prestige of, higher education teaching by:

- facilitating trials of additional funding for undertaking research and teaching development provided to individual staff based on their teaching performance, drawing on the Griffith Business School’s Teaching Excellence Recognition Scheme (TERS)
- trialling a modest Australian Research Council Grant that provides funding for teaching focused research for 6 months to a year
- enhancing preparation for higher education teaching, informed by the evidence collected by initiatives outlined in recommendations 8.9 and 8.11.

Learning about learning

While there are some academic centres for research into tertiary education teaching,¹¹² pedagogical research in tertiary education and clear guidance about best-practice is less developed compared with the school sector. Nevertheless, there is good evidence about the value of pedagogical training of higher education teachers (Chalmers and Gardiner 2015; Postareff, Lindblom-Ylänne and Nevgi 2007; Vilppu et al. 2019), which with synthesis and further research would provide better guidance about how to teach post-school students.

There is no body in Australia charged with synthesising and undertaking research into post-school teaching, promoting teaching excellence or sharing lessons about improving teaching quality in the tertiary education sector. The former Office for Learning and Teaching, which was responsible for supporting and incentivising effective teaching and encouraging innovation, was defunded in the 2016-17 Budget. In contrast, following the creation of AERO, there has been a renewed effort to create and diffuse an evidence base for excellence in early childhood and school teaching.

The differences between desirable teaching practices in school, VET and higher education have narrowed as the higher education system has shifted from an elite-only system to the primary destination of a far more diverse group of students. In any case, the process of learning does not radically change in one year as a student transitions from school to subsequent training.

Given the complementarity between teaching in all parts of Australia's education system, AERO should assume a broader role in developing an evidence base for all types of teaching, making it accessible to users and encouraging adoption and use of the evidence in teaching and education policy. Commensurate additional funding would be required for AERO to exercise this role.

In undertaking that role, one (of many) potentially useful sources of information for AERO would be any lessons from the Australian Government's Australian Awards for University Teaching. There appears to be little attempt to document and distribute the lessons from awardees' success to other academics throughout Australia or to exploit the observed practices of high-quality teachers as an evidence base. An added advantage of systematically examining awardee practices is that it also adds status to the role of teaching.

A question is whether AERO's remit should go further to include coordination of pilots of pedagogical practice across a sample of providers to evaluate what works best in different contexts. This would represent a significant shift in AERO's function and expertise though that should not ultimately rule it out. However, in the medium term, the highest dividends will probably emerge from synthesising best practice from the existing Australian and global evidence base, noting that there are other avenues for primary research about effective tertiary teaching (such as ARC grants and the National Priorities Pool Program).

¹¹² For instance, the University of Queensland Institute for Teaching and Learning Innovation, the Melbourne Centre for the Study of Higher Education, and the National Centre for Student Equity in Higher Education.



Recommendation 8.11 Develop an Australian evidence base

The Australian Government should extend the role of the Australian Education Research Organisation (AERO) to the collection and dissemination of evidence on best practice post-school teaching, covering both VET and higher education. As part of this new role, AERO should also:

- draw on the lessons from the teaching practices of awardees of the Australian Government's Australian Awards for University Teaching
- undertake a rapid review of the use of formative and summative review processes and professional development initiatives in higher education institutions.

Treading cautiously with financial rewards and penalties

In principle, financially penalising or rewarding providers based on performance creates incentives for them to lift the quality of their courses, resourcing and teaching staff. The Australian Government introduced a performance-based funding (PBF) scheme in 2020 that linked funding incentives to four measures (table 4.1). The scheme was put on hold due to COVID-19, although it is scheduled to re-commence.

Previous PBF schemes in education have proven problematic in Australia and globally, including encouraging gaming (such as enrolling fewer students from groups less likely to perform well), lack of impact, and unfairness.

- The most significant Australian PBF scheme was the Learning and Teaching Performance Fund, which overwhelmingly rewarded universities that were able to attract better-performing students. In 2006, 63% of funding went to the Group of Eight and 0% to the Australian Technology Network of Universities despite the two groups serving similar numbers of students. In later years these disparities were reduced, but still remained very large (Harvey, Cakitaki and Brett 2018).
- Most US states and many European countries also have PBF. Systematic reviews and a meta-analysis of US schemes have generally found no effects on graduation rates, the metric targeted by these schemes, but often found decreases in participation by racial minority and low-SES students (Kivistö and Kohtamaki 2015; Li 2021; Ortagus, Kelchen, Rosinger & Voorhees 2020).

The PBF model introduced in Australia in 2020 was designed to avoid some of the pitfalls experienced by similar schemes overseas. For instance, rewards for increasing access to equity groups, such as Aboriginal and Torres Strait Islander students, account for the desirability of a more inclusive higher education system. The approach reflects some desirable features for such a scheme previously outlined by the Productivity Commission in *Shifting the Dial*, such as incorporating student-reported experience and outcome measures and differentiating by student type and discipline (PC 2017c, p. 35).

Table 4.1 – Performance-based funding metrics and weightings^a

Metric	Weight	How is it measured?	How is it assessed?
Graduate employment outcomes	40%	The overall graduate employment rate four to six months after graduation for domestic bachelor students based on QILT data, adjusted for local employment rates.	A university's performance against its own 5-year average.
Student satisfaction	20%	Domestic bachelor student satisfaction with teaching quality based on QILT data, adjusted by study area.	
Student success	20%	Attrition rates adjusted for students moving providers/courses, and controlling for some factors that influence attrition: full/part-time study, mode of attendance, entry basis, field of education, and age.	A university's performance against its predicted outcomes after controlling for the listed factors.
Equity group participation	20%	Participation of Aboriginal and Torres Strait Islander, low-SES and regional students.	A university's equity group participation rates compared with sector averages. ^b

a. Funding is allocated based on incremental bands within each outcome metric category. Universities receive 100% of the total for high performance, down to 80% and then 60% for poor performance. There is further scope for the lowest band to be ratcheted down gradually where a university performs poorly year-on-year. **b.** For regional and Aboriginal and Torres Strait Islander students, participation at over one half of the sector average is sufficient for full funding, for low-SES students participation at greater than one standard deviation below the sector average is sufficient.

Source: DESE (2021c).

Nonetheless, PBF in its current form is not likely to achieve its objectives, and the prospect that more sophisticated versions will address its deficiencies is uncertain. QILT is a useful tool, but its flaws suggest that providers should not be penalised based on differences in their scores (and it is not clear why teaching quality is the only domain of experience that counts). Controlling for local labour conditions alone is not sufficient to isolate the effect of providers on employment outcomes. In any case, even more sophisticated models that control for other factors do not look sufficiently reliable. As discussed in section 4.1 and appendix A, even after accounting for a range of confounding factors, variations in labour market outcomes cannot reliably be attributed to the efforts of providers, and using outcomes only four to six months after completion ignores that outcome variations between universities can be reversed after longer periods. Equity group participation is a desirable goal, but will only partly be under the control of individual providers, especially as governments play a central role in encouraging such participation and retention through various funding and outreach programs. Further, it may be appropriate for different providers to have different enrolment rates of equity groups as their course offerings, vocational orientation and demographic catchments vary. Penalties for attrition rates ignore the desirability of dropping out for some students and also pose the risk that providers may 'mark easily' to reduce their financial risks.

There are possible alternative incentive mechanisms to PBF, including making universities liable for part of students' HELP debt or withholding part of CGS funding until a student completes their degree (PC 2017a, p. 107). But these have similar or other problems that suggest they too should be treated with caution.¹¹³

¹¹³ Both measures have similar drawbacks associated with attribution and would have a much greater time lag than current PBF arrangements, which blunts the incentives to improve relative to the PBF scheme. HELP debts take 7–10 years to be paid off on average (DESE 2021b), while students frequently take 6–9 years to complete their degree (DESE nd), meaning universities could be out of pocket for investments in quality improvements for years until they pay off. 'Completion bonuses' also serve the same purpose as including attrition as a metric in PBF, which explains over 90% of the variation in completion rates between universities and is far more timely (Wellings et al. 2019).

Possibly the lowest-risk option for using financial incentives to encourage higher quality teaching are modest rewards for providers that are identified as making genuine and successful efforts to improve and use formative assessment tools and professional development. Rewards for inputs are often inefficient, but if they are likely to be causally related to outcomes and if it is easy to measure their uptake, then this approach can be superior to rewards for outcomes that cannot reliably be attributed to the provider.

Furthermore, a return to a demand-driven system acts as a de facto performance-based funding model as providers who can successfully signal their quality will be rewarded through additional enrolments and revenue (chapter 3).



Recommendation 8.12

Favour light-handed and simple incentives over performance-based funding

The Australian Government should:

- put on hold the scheduled commencement of performance-based funding of universities in 2024 and only reinstitute if its risks are better managed and if other approaches to improving the performance of universities have proved ineffective
- explore the option of financial rewards to higher education providers that AERO identifies as having made successful efforts to improve and use formative assessment tools and professional development (drawing on recommendation 8.11).

4.4 Supporting retention and completion

Completion of valuable training, not enrolment, is the goal of education. While non-completers can acquire skills and will often still get jobs, completers tend to get better outcomes. This applies to both universities (PC 2019, p. 47) and VET (NCVER 2021c).

However, defining an 'optimal' level of completion is difficult because some level of attrition is inevitable, can be beneficial and can reflect factors beyond the control of providers:

Factors affecting an individual's completion are complex and can include the level of support from teachers and the institution, course content, course satisfaction, and the student's own expectations and personal circumstances. Institutions can influence some, but not all, of these factors to produce a more favourable outcome. On the other hand, some level of attrition must be expected and should be accepted. (Bradley et al. 2008, p. 19)

In 2019, the most frequently cited reasons for considering early departure from university were dominated by personal circumstances that largely lie outside the control of providers: 'health or stress' (46%), 'need to do paid work' (27%) or 'need a break' (24%) (SRC 2022c). However, others cited reasons related to their learning and teaching experience, such as 'workload difficulties' (25%), 'expectations not met' (22%) or 'academic support' (19%).

VET non-completers overwhelmingly cite employment-related reasons for leaving study. The most common of these are: leaving one's job or changing career, being made redundant, and having poor relations with their manager or workmates. In 2019, 73% of non-completers cited employment-related reasons, far outstripping the share who cited training-related reasons (11%), such as lack of support or being unhappy with the training (NCVER 2020).

The right pathway therefore depends on each student's individual circumstances. Giving students the best chance to follow through with their individual goals — whether this means completing their studies or having a go and dropping out swiftly — can help improve the efficiency and productivity of the tertiary sector.

Risk of non-completion is unevenly spread

Some students and institutions exhibit greater non-completion risk. For universities, equity group students — those from low-SES backgrounds, from remote areas or of Aboriginal and Torres Strait Islander descent — have below-average completion rates within six years of starting a degree (figure 4.4). And the share not completing has increased in recent years, particularly for low-SES and remote students. This partly reflects that the demand-driven system intended to encourage greater enrolments even though providing more opportunity involved a higher risk of non-completion (PC 2019, p. 9).

Lower university completion rates are also observed among part-time students, entrants with ATARs below 70 and those studying externally (that is, off campus or online); completion rates for these groups are very low and comparable to some equity groups. Students in these groups represent a sizeable proportion of the student population: in 2020, external students and part-time students represented 33% and 34% of the commencing domestic student body, respectively. In comparison, low-SES students, the largest equity group with below-average completion rates, comprised 19% of commencing students in 2020 (DESE 2022b). Persistently low completion rates among these non-equity student groups hints at structural factors that make completing an undergraduate degree more difficult for these students. Risks of non-completion are compounded where there are intersections between these groups and equity status (Edwards and McMillan 2015).

Non-completion also varies by institution. A student's choice of institution has the most influence over their chance of attrition, outweighing other student-level factors such as attendance type (part- or full-time), study mode, and equity group status (HESP 2017). Other evidence found similar variations in dropout rates across providers (Cherastidham and Norton 2018). Institutions with smaller student populations and low levels of senior academic staff also have higher first-year attrition rates (TEQSA 2017a). Such variance may reflect institutional-level differences in teaching quality and other capabilities (section 4.1).

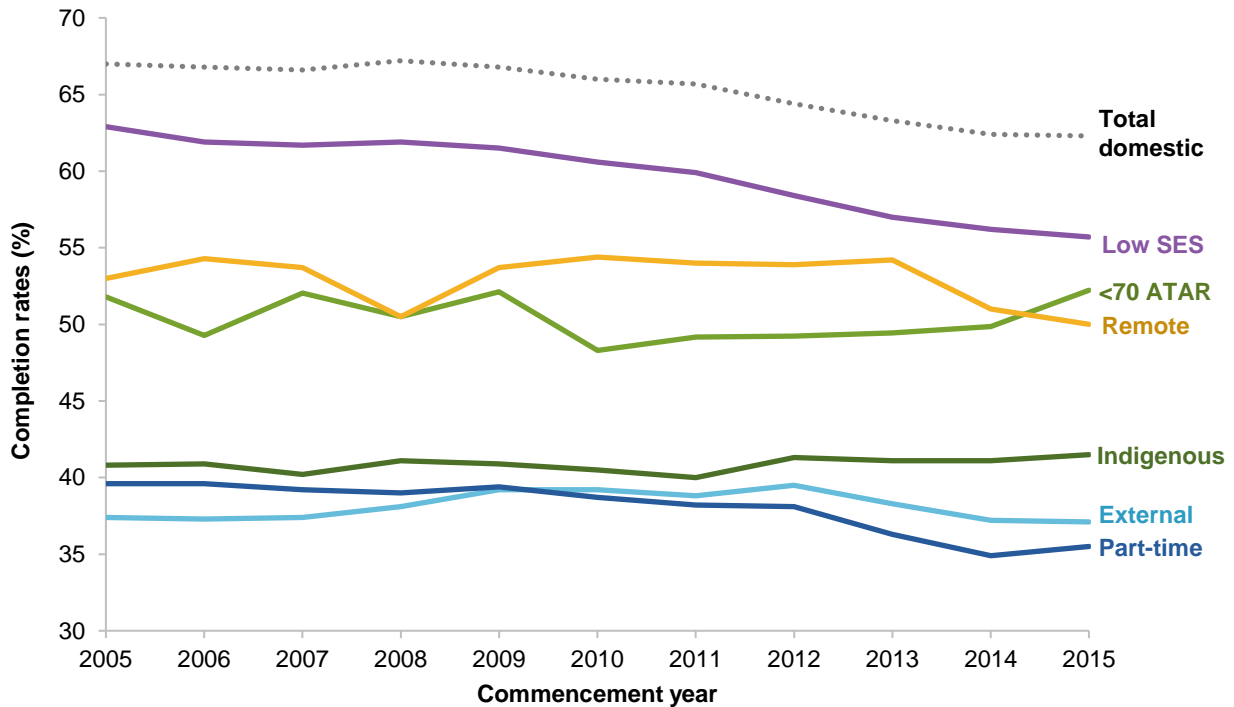
By contrast, VET completion rates have been steadily increasing, and this trend has been reflected across equity groups. Completion rates for students with disability, from very remote locations and Aboriginal and Torres Strait Islander students have all increased over the past decade (PC 2020c). This may be attributed to better targeting of qualifications and skill sets or improved quality of delivery, such that a larger share of students complete only the components of a qualification they really need.

Completion rates also differ by provider type. Those training with an enterprise provider¹¹⁴ are much more likely to complete their qualification than their peers, particularly students at TAFE (NCVER 2021b). However, this may be explained by differences in student mix. The average student attending an enterprise provider is older and of a higher socioeconomic status than those at TAFE (PC 2020c) — two characteristics that improve the likelihood of completing their VET qualification (McVicar and Tabasso 2016).

¹¹⁴ A company accredited to deliver qualifications to its own workers, whose primary business is not the delivery of training and development.

Figure 4.4 – Degree completion rates are below average for several equity and non-equity student groups^{a,b}

Completion rates for bachelor degrees within six years, by student groups



a. The completed course may not necessarily be the same course that the student initially enrolled in. For example, a student may have commenced a science degree but completed an arts degree; or commenced study at one institution, but completed at another. Low SES is measured as the bottom 25% of Socio-Economic Indexes For Areas (SEIFA). SEIFA scores are produced by the ABS and rank areas in Australia according to relative socio-economic advantage and disadvantage. **b.** While part-time students would be expected to complete their courses more slowly, they are still significantly less likely to complete a degree even after 9 years.

Source: DESE (2022a).

Understanding the determinants of non-completion is an important step to supporting optimal completion rates. The variations among different student cohorts and providers suggest that providers could learn from each other about the best ways to lift completion rates for students at greater risk of non-completion.

Improving completion for equity groups continues to be important ...

Education policy for equity groups aims to promote enrolment in tertiary education and increase the likelihood that an enrolled student completes their studies. Addressing these challenges ensures that students who face disadvantage can benefit from tertiary education and helps eliminate structural inequities.

In response to these challenges, the Indigenous, Regional and Low-SES Attainment Fund (IRLSAF) combines several pre-existing funding arrangements designed to support equity students.¹¹⁵

As part of the IRLSAF, the Higher Education Participation and Partnerships Program (HEPPP) provides funding to universities to implement strategies that improve access to undergraduate courses for identified equity groups,

¹¹⁵ Specifically, this includes people from regional and remote Australia, low-SES backgrounds, and those of Aboriginal and Torres Strait Islander descent.

and to support retention and completion for these groups. There is some evidence at an individual program level that HEPPP initiatives have improved outcomes (for example, NCSEHE 2017; Zacharias et al. 2016). However, given other factors influencing completion rates, it is challenging to assess the causal effect of the HEPPP on completion rates, which remain stubbornly high for equity groups. An evaluation of the HEPPP cautiously concluded that there was evidence it contributed to improvements in student outcomes, but that the extent of the impact could not be quantified with available data (ACIL Allen Consulting 2017).

Part of the challenge in identifying the effectiveness of the HEPPP is its concurrent operation with the demand-driven funding system. Indeed, demand-driven funding was accompanied by additional HEPPP funding to universities in proportion to the number of students they enrolled from equity groups, in part to meet the cost of additional support needed to allow some students to succeed. The Productivity Commission found:

Universities choose how to deploy these funds and in practice it supports a myriad of different programs. Their efficacy has not been evaluated at a program level. This study at a system level at least suggests two hypotheses: that the additional funding has been used ineffectively; or that it has proved insufficient to meet the needs of students from disadvantaged backgrounds. Possibly both hypotheses are true. (PC 2019, p. 69)

Supporting access and retention of equity students remains a priority. For Aboriginal and Torres Strait Islander students, the National Agreement on Closing the Gap has set a target of 70% of Aboriginal and Torres Strait Islander people between the ages of 25 and 34 to attain a Certificate III or above by 2031. While progress has been made to meet this gap, increasing from an attainment rate of 19% in 2001 to 42% in 2016, there is still some way to go to meet the target (PC 2022).

But equity education policy has continued to develop. Regional University Centres, which provide facilities and support to students studying in remote areas have been successful (Country Universities Centre, sub. 119), with eight more Centres to be opened in 2023. Further, there have since been efforts to improve the evidence base for initiatives funded under the HEPPP. A new *Student Equity in Higher Education Evaluation Framework* was designed to share lessons across the sector about equity activities that work through three levels of evaluation:

- overall national program evaluation of the HEPPP and its outcomes
- quality improvement evaluations of HEPPP-funded projects
- evaluations of the effectiveness and impact of HEPPP-funded projects (Robinson et al. 2021).

This process has yet to commence but represents a positive move toward ensuring that HEPPP funding is targeted at initiatives that have the greatest impact on objective outcomes, such as student completion rates.

... but more could be done to support non-equity students to complete

The HEPPP should remain focused on equity groups. Extending its purpose beyond Aboriginal and Torres Strait Islander, low SES and remote students would dull the incentive for providers to target funding toward equity group access and completion.

However, there is merit in extending new measures that support retention beyond equity groups to others with elevated risk of non-completion. As the share of the population accessing tertiary education grows, effective supports will become increasingly important for a wider range of students. Indeed, many of those belonging to equity groups study part-time or externally (Edwards and McMillan 2015). But this overlap does not always apply and may diminish over time. The share of external students, for example, has grown through the past 5 years, with more undergraduates opting to learn externally while internal student numbers continue to decline (DESE 2022f). Student support and resources will need to accommodate these demographic changes and the challenges they bring to students' preparedness for higher education.

While group affiliation will still inform the types of support measures appropriate (for example, culturally safe interventions for Aboriginal and Torres Strait Islander students), providers should be able to test new measures to screen students, identify those specifically at risk and provide support. A combination of many approaches is likely to be needed across the sector given the unique characteristics and needs of individual students and providers (box 4.2). In some cases, this may simply require earlier intervention to engage struggling students with existing support services. Subject coordinators could include links to tutoring services on the subject's webpage, or ensure that students who fail the first assessment attend a mandatory meeting with their subject tutor. In other cases, novel approaches may be required.

Box 4.2 – Specific measures to improve support for students

The Productivity Commission has made several recommendations in recent reviews aimed at improving supports for tertiary students which remain relevant.

Better mental health supports for tertiary students

The *Mental Health Inquiry* recommended strengthening accountability of tertiary providers with expanded mental health support, including:

- expanding online mental health support and collecting de-identified data to inform service improvement
- ensuring international students are adequately covered for mental health treatment and counselling services meet language and cultural diversity needs
- requiring all tertiary providers to have a mental health and wellbeing strategy as a part of registration
- the development by the Australian Government of guidance for non-university higher education providers and VET providers on how they can best meet student mental health needs
- monitoring and disseminating information on best practice interventions by TEQSA and ASQA.

Better supports for apprentices and other VET students

The review of the *Skills and Workforce Development Agreement* identified several gaps in support for apprenticeships and recommended:

- screening apprentices to improve completion rates, and identify needs for support services, and if found to be cost effective, extending this to all VET students
- improving apprenticeship support services through more co-operative contracting arrangements, and expanding services to areas of unmet need.

Source: PC (2020b, p. 254); PC (2020c, pp. 346, 354).

Programs found to be successful should be replicated throughout the sector, although determining program success has proved difficult. Program evaluation across the sector is piecemeal, but there are instances where evaluations have identified positive initiatives, which have then been adopted more widely. The National Centre for Student Equity in Higher Education (NCSEHE) recently funded an internal evaluation of the Victoria University Block Model, which found significant reductions in failure rates (Jackson, Tangalakis and Solomonides 2022). This has led other universities, including Southern Cross and Murdoch, to introduce their own versions of the block model.

TEQSA (2020) has developed a Good Practice Note to share institutional retention strategies and lift performance in this area.¹¹⁶ However, while it identified 29 'good practice' examples, TEQSA has had to rely on a thin evidence base and acknowledged that 'many providers have difficulty demonstrating whether particular initiatives have worked' (p. 5). Some simply cite a correlation between having the program in place and generally high retention rates at an institution level. Others present survey evidence that students reported feeling positive about the experience or reported improved satisfaction, without demonstrating any effect on retention.

TEQSA notes that further exploration is needed into the structural factors that limit part-time and external students' likelihood of completion. This goal can only be realised if there is sufficiently reliable evidence on cost-effective support measures. Evaluations of retention programs should use a robust strategy for identifying program effects and measuring objective outcomes to enable cross-program comparison (box 4.3). They should also be made publicly available where feasible.

In the lead up to the *Student Equity in Higher Education Evaluation Framework*, several reviews recommended a central clearinghouse to support dissemination of evidence about effective equity initiatives (Bennett et al. 2015, p. 9). This could be broadened to encompass retention strategies that target all students (both equity and non-equity) at higher risk of non-completion in all tertiary settings.

Developing an evidence base and improving outcomes will first require providers to invest in interventions. Absent sufficient incentives to further expand and innovate in providing student support, providers may be unwilling to experiment with new retention programs.

Extending a grant to higher education providers aimed specifically at retention and completion can reduce this unwillingness. Providers would apply to the Department of Education for funding, outlining the specifics and the expected impact of their proposed initiative. Universities would be able to apply for funding annually (depending on the initiative, the grant could be for more than one year). Given the high number of external and part-time students, experimentation with a large cohort will likely yield more robust results. Pairing this with a sector-wide evidence base will ensure that programs can be evaluated within their contexts and applied by other institutions where viable.

Not pushing retention at all costs

Some students may benefit from support to exit quickly if a course does not suit them. Not completing a qualification, or taking excessively long to do so, incurs costs for students (forgone earnings from a job, spending on course material, and course fees or accrued debt) and taxpayers (given governments subsidise tertiary education).

'Debt and regret' appear to be commonplace among university non-completers:

- almost 40% would not begin their degree again knowing what they know after dropping out
- about one third believe they received no benefits from their course
- nearly two thirds believe they would have been better off if they had finished (Norton and Cherastidham 2018).

¹¹⁶ Institution retention strategies and TEQSA guidance on good practice both stem from recommendations in the Higher Education Standards Panel review on *Improving Completion, Retention and Success in Higher Education* (HESP 2017).

Box 4.3 – Good practice evaluations are needed for an optimal retention program

Evaluation of support programs involve many practical and methodological challenges, including a clear framework for determining whether a program causes an outcome, ethics clearance and adequate data. Where a survey is used as a component of an evaluation, another wide range of considerations are at play: identification of unbiased sample frames; recruitment of respondents, stratification and weighting strategies; questionnaire design and piloting; interview training; and non-response follow-up approaches. Often, evaluations only assess how responding students view a program, which provides minimal guidance to universities.

A well-designed program can profoundly improve student outcomes. For example, an evaluation of the US-based OneGoal program (a university preparatory program for low-income high school students) found that participants have an almost 50% higher chance of going to university than their peers and a 40% higher chance of graduating (Hallberg et al. 2022, p. 27). This program also demonstrates the benefit of scaling such effects, having grown from a local pilot program to a national organisation serving 17 250 students by 2021 (OneGoal 2021, p. 5).

Building randomisation into programs can identify how they can best operate. For example, a retention program at Charles Sturt University introduced a pre-census date assessment, with students failing to submit being contacted to be offered support if they wished to stay, or to be assisted to withdraw before the census date if they did not. When the program was trialled, students were randomly allocated to different potential designs.

- Students not submitting the early assignment in one subject were either contacted by the subject coordinator or an outreach team. Students were far more likely to modify their enrolment if contacted by the outreach team, despite almost all of those who remained enrolled failing to submit any further assessments. This suggests that specialised professional staff may sometimes be better placed to contact disengaged students.
- Different methods of contacting students were tested. A phone call alone had a 20% success rate, but the most effective method was a phone call, followed up by a text and an email if no contact was made. This increased the call success rate to 55%, but discovering this required a willingness to trial and evaluate different options.

This, and other well-designed program evaluations suggest the importance of personalised contact through a combination of text messages and phone calls rather than emails alone, and the potential benefits of using early assessment to identify disengaged students.

However, each university operates in a unique context, and findings from one setting will not always be universal. This underscores the importance of each institution testing different approaches to understand how retention programs can best achieve their goals — and of having a mechanism to share lessons.

Source: Linden (2022).

A student dropping out does not necessarily imply that enrolling was the wrong decision, or that no benefit was received. Most people who drop out of university report some benefit for their personal growth, skills or career (Cunninghame and Pitman 2020; Norton and Cherastidham 2018). However, a key question is whether these benefits outweigh the costs (both to the student and the taxpayer), or whether an earlier exit would have been better. Delayed exits mean that students are likely to forgo wages or can displace other

options in their lives, such as an alternative academic pathway. It can be difficult for potential students to determine if a particular qualification is right for them without firsthand experience. Some may discover that they lack the requisite academic preparation or interest in the subject matter. Others may face personal or financial issues that leave them unable to complete their course. Yet, many of these students stay enrolled in courses beyond the point at which it is apparent they will not succeed, incurring costs for themselves and governments. This is more pressing in the university context than the VET sector because university courses are longer and loans are more prevalent (although expanding eligibility for income-contingent loans in VET may change this (chapter 3)).

Given it is difficult to predict if a pathway is right for a student, the system needs to allow for experimentation, but encourage quick exits when necessary.

Nested qualifications lower the cost of an early exit

For some, a partial qualification may be a better outcome than completion. A student may gain enough knowledge from their studies to secure their desired job and learn the rest on the job. In the VET sector in particular, some individuals enrol in qualifications with the intention to take particular subjects and obtain targeted skills, rather than a complete qualification (NCVER 2016).

However, it can be challenging to have this knowledge recognised. Without a formal qualification, students may have difficulty demonstrating the skills they gained to employers. This is particularly problematic for disadvantaged students who are more likely to face financial or health issues that make it more challenging for them to complete their studies.

For VET students, the Productivity Commission's NASWD review highlighted the need for better information about credit pathways, and reducing barriers to credit pathways that would reduce the risks associated with partial completion (PC 2020c, pp. 211, 430).

In higher education, the availability of nested qualifications (for example, awarding an associate degree to a bachelor student who withdraws after two years) can help lessen the cost of experimenting with higher education for those unsure if it would suit them (TEQSA 2019). These qualifications are uncommon at the undergraduate level.¹¹⁷

Student equity researchers and the Higher Education Standards Panel have recommended the expansion of these qualifications (Harvey and Szalkowicz 2016; HESP 2017; Nelson et al. 2017). This could assist students who are only able to complete part of their studies by providing information to employers on their capabilities and facilitating a potential return to study. The provision of such awards is beneficial so long as they do not compromise the coherence and quality of course design.

¹¹⁷ Not all universities offer Diplomas or Associate Degrees as a form of 'alternative exit' from a bachelor's degree. However, a number of institutions do offer early exit degrees and awards, including but not limited to: Charles Darwin University, Flinders University, James Cook University, University of the Sunshine Coast, and Deakin University.



Recommendation 8.13

Expand alternative exit opportunities through the provision of nested qualifications

The Australian Government should require that for any given undergraduate degree, Australian higher education providers create at least one subset of courses that, if completed, lead to a lower level qualification for students who decide to withdraw before completing the whole degree ('a nested qualification').

The Australian Government should leave the design, requirements, and timing of the nested qualification/s to providers' discretion, with the exception that any qualification would need to meet the relevant Tertiary Education Quality and Standards Agency (TEQSA) standards and monitoring requirements.

A different approach to census dates could improve enrolment decisions

Many students are still enrolled in units of study they do not wish to take at the date at which students incur fees for their course (the census date). Indeed, at one university a mark of zero was recorded for nearly 4% of units of study — consistent with little or no engagement by the relevant students. About one in ten commencing students recorded a mark of zero in at least one subject (Stephenson, Cakitaki and Luckman 2021). Even students who go on to pass a subject they enrol in may have benefited more from pursuing an alternative, but were too late to change their enrolment.

Recent regulations that took effect in 2022 attempted to ensure only 'genuine' students received government funding and to protect students from study for which they are not suited (DESE 2022c). Students who, after undertaking eight units of study, have failed most of them will lose CSP eligibility for that course.¹¹⁸ However, this will not protect disengaged students from debt incurred in their second semester.

Current arrangements require students, including those disengaged from their studies, to understand a complex system and make an active choice. Most students either do not know when the census date is or are unaware that if they are enrolled at the census date, they accrue the debt for that semester. More than one in ten students had missed the census date for a subject they wanted to drop (Norton and Cherastidtham 2018).

There is scope to reduce this complexity to give students greater clarity and prompt them to make the decisions best suited to their educational needs. A number of levers are available to universities to improve students' enrolment decisions. Text messages, rather than email reminders, could be used to inform students of the upcoming census date, as text messages are more likely to reach disengaged students and prompt them to act. Courses could also ensure that students are engaged in their studies prior to their census date through a small assessment early in the course. Students who do not submit this assessment would be contacted to ensure that they still wished to continue, and could be withdrawn following repeated failure to respond (Norton and Cherastidtham 2018). A similar approach — although more focused on offering support than allowing for a costless exit — is already taken by many universities and seems to be effective (Linden 2022; Parks, King and King 2021). As with supports for retention, there would be benefit in trialling different options at an institutional level to see what works.

To highlight the importance of what otherwise seems like an obscure issue, students should be made aware of the harsh reality that a census date is a notice of a payment that, if not acted upon, will entail unnecessary

¹¹⁸ Students are still able to receive a CSP if they change course.

and unproductive debt. Altering its name to 'payment date' to be more explicit may help students to withdraw or nominate alternative subjects before incurring a liability.

The above options are likely to encourage a rapid and less costly exit for students who will not succeed in their studies, and instead pursue more productive pathways. They are also unlikely to worsen completion rates, primarily causing students who would not have completed their studies to exit sooner, rather than raise longer-run exits. Additionally, this may free up places for students that are more likely to complete their studies. When combined with grants to improve student retention measures, these strategies will ensure that students are better supported to make decisions that benefit their labour market choices in the long run.



Recommendation 8.14

Give students support to complete and clarity to exit

The Australian Government should amend the *Higher Education Support Act 2003* (Cth) (HESA) to support completion where desirable and facilitate early exits where necessary.

It should do this by:

- providing grants to encourage higher education providers to experiment with and share new strategies for student retention
- assessing any individual grant for its effectiveness and lessons in post implementation reviews and evaluating the higher education grant program as a whole after six years to determine whether rounds of funding under the grant have contributed to a demonstrable improvement in student completion rates
- amending the 'census date' in the HESA to the 'payment date' and requiring that universities effectively communicate to students that the payment date is the time when they can exit without having to pay fees for any initially commenced course.

4.5 Teaching for adaptive skill needs in VET

Notwithstanding the strong growth of the higher education system, VET remains a key system for acquiring formal post-school training with about 4 million students in 2021 compared with about 1.5 million for higher education (NCVER 2022b).¹¹⁹ Given its scale, the central role it plays in lifelong learning, and the changing nature of the vocational skills required in an increasingly digital and service-based economy, overcoming systemic flaws in its design has become a major policy preoccupation.

Several recent reviews, including the Joyce review and the Productivity Commission's NASWD review, have aimed to improve and update the VET sector. While JCSF Consulting's (sub. 97, p. 2) observation that there is 'no shortage in the stock of ideas for betterment of Australia's tertiary education system' rings true, reform implementation in the VET sector over the past five years has been slow, partly due to COVID-19.

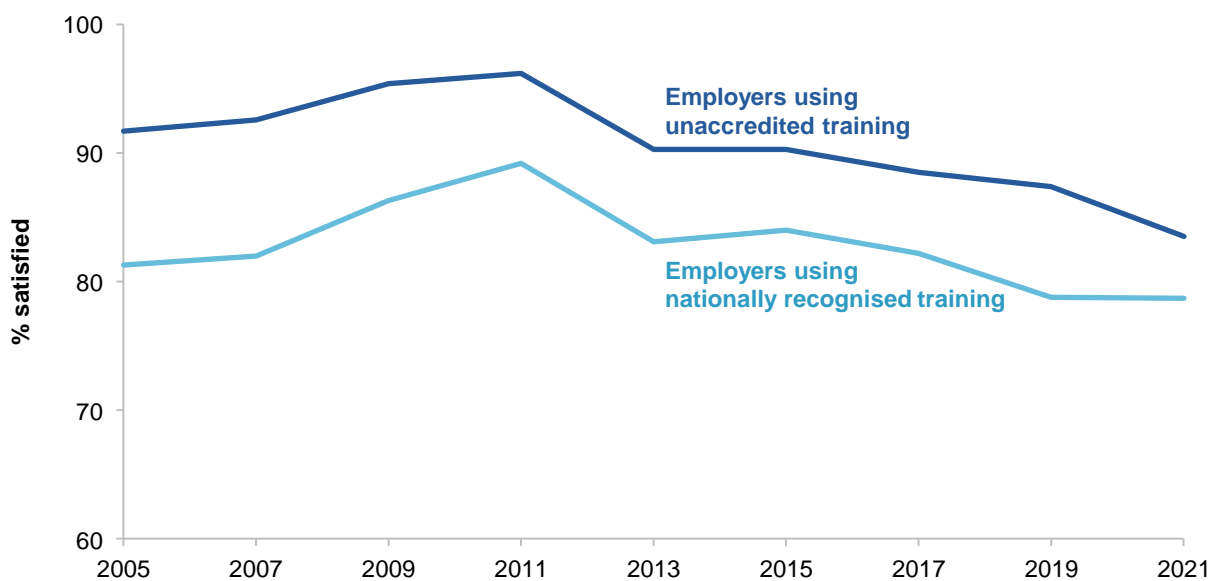
In this environment, employers' satisfaction with VET has continued to trend down, with satisfaction for nationally-recognised training consistently lower than unaccredited training (figure 4.5). In 2021, the overall gap in satisfaction was just under 5 percentage points. The difference is more stark for certain industries, with the largest gaps for 'information media and telecommunications' (25 percentage points) and

¹¹⁹ When adjusted for full-time student loadings, the systems are closer in relative size, reflecting that VET covers a much greater diversity of courses, including short vocational courses to meet specific knowledge gaps.

‘administrative and support services’ (18 percentage points) (NCVER 2021a). As noted in this inquiry’s companion volume *‘Australia’s data and digital dividend’*, for digital skills acquisition, many employers prefer industry-provided short courses compared with formal learning options offered in VET and other sectors.

Among those employers dissatisfied with nationally-recognised training, the most common concerns were that it did not teach relevant skills (37%) or was of poor quality (36%), with some also reporting the content was outdated (14%). Further, the most common reason employers cited for favouring unaccredited training was that it was tailored to their needs (38%), with the share giving this reason almost doubling from 2015 (NCVER 2021a).

Figure 4.5 – Employer satisfaction is consistently higher for unaccredited training
Percentage satisfied among employers using VET



Source: NCVER (2021a).

Skills Reform has the potential to drive much needed change

Over the past year, there has been greater action in implementing VET reform recommendations (DEWR 2022d). The recent *Skills Reform* measures are welcome and necessary steps in transforming the VET sector so that it is better able to teach, recognise and develop adaptive skills. These reform measures are wide ranging, and *if* successfully implemented, have the potential to fundamentally re-shape the VET sector. The measures include changing the existing qualification framework and updating training package content and development, including an overhaul of competency-based assessment.

Training package development and content will be more responsive

Training packages and competency-based training (CBT) and assessment have been the cornerstone of the formal VET system since the early 1990s. In this inquiry, the Productivity Commission found there is still broad-based support of CBT, which has several important and well-established benefits.

- By focusing on the **outcome** of training (what the student can do), rather than the **inputs** (such as time spent training or who delivers it) it supports a model of contestable and open training markets.
- It means **qualifications** are nationally **portable** and have currency with industry regardless of where they were issued; as well as facilitating credit transfer for students.

- It allows for an **industry-led** (rather than provider-led) training system, with industry representatives involved in defining and updating competencies being taught.
- The process of assessing students' competency, by observing the performance of tasks and awarding qualifications, also provides an important form of **quality assurance** for training outcomes.

Training packages allow industry representatives to agree on and define units of competency that are necessary for an occupation.¹²⁰ RTOs then develop course material to meet the competencies embedded in training packages.

However, submissions noted the overly prescriptive nature of CBT (Ronald Jackson, sub. 171, p. 12) and the difficulties in developing timely and relevant training package content (NECA, sub. 108, p. 2). These concerns were also raised as part of the Joyce Review (2019a, p. 58) and the Productivity Commission's NASWD review (2020c, p. 238).

Despite its strengths, CBT is backwards-looking by nature. It is prescriptive and limited to actions that can be applied and observed in an existing workplace setting. This can be highly effective for certain forms of training, such as regulated trades where job requirements are relatively stable and competency can be clearly observed and mapped to workplace actions. But it can limit acquisition of broader knowledge that can be adapted and applied in multiple and fluid settings. Training packages can quickly become outdated, particularly for digital skills for which regular and quick updates are necessary for continued relevance (Wibrow, Circelli and Korbelt 2020).

However, major reform in this area is now underway.

As part of the *Skills Reform* initiative, newly-formed Jobs and Skills Councils (JSC) will have responsibility for training package development, taking over from Industry Reference Committees and Skills Service Organisations (DEWR 2022a).¹²¹ Under the previous system, it would take a year to develop a training package and endorsement could take years more (Joyce 2019b). JSCs will have greater industry representation and are intended to make training package development less time-consuming and more responsive.

Changes are also underway for CBT. One of the key *Skills Reform* projects is the VET Qualifications Reform program that proposes to replace units of competency with 'Skills Standards'.¹²² The purpose of Skills Standards is to reflect broader attributes and functions required by an occupation, as opposed to specific job tasks that were more easily distilled into units of competency. They are intended to be predominantly 'industry-sector neutral', and can be either 'cross sectoral' which are relevant to multiple industries, 'specialised' which are more industry-specific 'or 'foundational' which can be applied across all industries for standards relating to reading, writing and numeracy (DEWR 2022b). Using an example of how the proposed model would work when applied to the Certificate III in Floristry, the qualification's 16 core units that sit within 40 overall units of competency would be replaced by six broad skills standards (Ai Group 2022, p. 6).

This allows for formal recognition of a more applicable and portable set of skills for a person who may have a series of jobs either within a sector (for example, services or hospitality) or across several sectors over their

¹²⁰ Nationally-recognised qualifications comprise 'units of competency' (individual subjects such as 'responsible service of alcohol') which may be grouped into 'skillsets' (such as 'work zone traffic control' or 'food safety supervision', both of which are included in 'training packages' (such as a Certificate or Diploma).

¹²¹ The ten industry groupings for the new JSCs are: Agribusiness; Arts, Personal Services, Retail, Tourism and Hospitality; Energy, Gas and Renewables; Finance, Technology and Business; Manufacturing; Mining and Automotive; Transport and Logistics; Public Safety and Government; Early Educators, Health and Human Services; and Building Construction and Property.

¹²² Consultation on this model is currently underway with a stakeholder survey and information sessions conducted by the Department taking place over the first half of 2023 (DEWR 2022b).

working life. It also allows for the assessment of generic, non-technical skill sets that apply across occupational groupings that are of growing importance to Australia's economy (chapter 1).

Skills Standards will also be independently assessed, in line with the Productivity Commission's recommendation in the NASWD review, to help allay concerns about uneven quality standards among VET graduates and provide employers with greater confidence (PC 2020c, p. 249). There has also been some movement toward incorporating proficiency-based assessment, as previously recommended by the Productivity Commission (2017a, p. 96). The Digital Skills Organisation¹²³ *Digital Pathways Project* incorporates levels of proficiency across three groups in their occupational standards assessment system to better reflect the broad range of digital skill sets needed across most present day occupations (Schueler 2021, p. 25).

The framework and existing implementation plans for these changes are sound. The test will be whether they are delivered promptly and well. Ten JSCs are expected to become fully operational over 2023 (DEWR 2022a). When assessing the efficacy of training package development in 2019, the Joyce Review found that an over-bureaucratized process and a lack of industry engagement led to training packages becoming 'very cumbersome and complex and too hard to change' (2019a, p. 53). There is a need to oversee the new VET system 'architecture' to ensure that training product development avoids the time consuming and bureaucratic processes of the system it is replacing.

The Independent Training Package Assurance (ITPA) function in the Department of Employment and Workplace Relations (DEWR) should extend its existing role to monitoring the output of the JSCs to ensure that the time taken to develop training packages is shorter, while remaining responsive to industry and workplace requirements. Examples of innovative training package design should be identified by the ITPA function and disseminated across the wider network of JSCs to establish models of best practice. DEWR should also guide and assist the JSCs in developing cross-sectoral skills standards as a priority over the next year. This will also reduce duplication for the JSCs as they commence their training package development work.



Recommendation 8.15 **Support a responsive VET sector**

The Australian Government, in consultation with State and Territory governments, should continue reforms that enable the VET sector to support an adaptive workforce and keep pace with industry needs, by:

- monitoring the development of training packages under the newly formed Jobs and Skills Councils (JSCs) to:
 - ensure their development takes place within acceptable timeframes
 - identify and disseminate best practice and innovative training package design models
- prioritising the development of cross sectoral skills standards that are applicable across industries over the next year to both reduce duplication in training package development for the JSCs and allow individuals enrolled in the VET system to be assessed against these new standards as soon as possible.

¹²³ This is one of three recently completed Skills Organisation Pilots trialling new approaches recommended by the Joyce Review. The other pilot programs covered the mining and health industries.

The VET workforce will also need to be supported

The greater ambitions and sophistication of the new VET system will require further investment in VET workforce capability across a wide range of delivery modes — VET in schools, Adult and Community Education providers, private RTOs and TAFEs.

A prominent but contested concern is whether VET teachers have sufficient skills. Some argue that VET teachers have become deskilled due to a twenty-year reliance on CBT and declining levels of pedagogical (VET teaching) qualifications since 2000 (ACDEVEG, sub. 116, p. 1).

Changes to address such perceived gaps in capabilities involve trade-offs.

On the one hand, demanding higher levels of training than the existing Certificate IV for trainers may limit supply, especially given that a significant source of teachers are people who have worked formerly in industry and have commenced a teaching role later in life, and often only on a part-time basis. Indeed, trainers and assessors do not even need to complete the Certificate IV in Training and Assessment (the minimum qualification requirement) before working in the sector, just to be enrolled in the course as soon as practicable. This reflects the need to access trainers with relevant and up to date industry experience.

On the other hand, even if VET teachers have strong practical knowledge, transmitting that effectively requires pedagogical skills, an issue that has confronted governments for some time.

There has been some recent action to improve the quality of teaching in the VET sector, including an updated Training and Education Training Package with an improved version of the Certificate IV qualification that has greater pedagogical depth and rigor (Smith 2022, p. 9). Nonetheless, there is a concern that moves to incorporate proficiency or some other form of graded assessment will require an added level of independent judgement on the part of VET teachers and trainers that has to be justified or defended against some form of external review, and that these are 'skills that go way beyond what is in the Cert IV Training and Assessment' (Misko and Circelli 2022, p. 23). As the VET assessment system evolves beyond CBT to incorporate independent and proficiency-based assessment, the VET workforce will need to access appropriately designed and funded professional development opportunities to implement these new assessment methods successfully. In light of this, the Australian Government should fund extra training and development programs for VET trainers and assessors so they can adequately perform independent and proficiency-based assessment.

An associated challenge is that even under the current system, there are major obstacles to an adequate VET teaching workforce, with difficulties in retaining adequately trained staff in the current tight labour market and, over the longer term, the implications of an ageing workforce.

Strategies for addressing attraction, retention, career development and succession planning are being developed as part of the upcoming *Blueprint for the VET Workforce*. The VET workforce strategy should be underpinned by evidence, including a VET workforce census, undertaken by the National Centre for Vocational Education Research that would focus on teachers' industry experience, pedagogical and professional characteristics (PC 2020c, pp. 243–244).

More flexibility and experimentation in provider models will also support the continued relevance of VET

A more flexible approach across Australia's tertiary sector will require greater autonomy for VET providers. For example, in Singapore, quasi-Government VET institutions have greater autonomy to develop and assess courses (Varaprasad 2021), which has contributed to a higher status for VET:

In Singapore, the formerly dilapidated Institutes of Technical Education have been entirely overhauled, materially and in spirit. Now, they emphasise future skills training, with a technology edge ... This, in turn, has amped up the prestige of the sector, drawing in students who would have previously only considered a university education. (Peter Noonan cited in Siekmann and Fowler 2017, p. 33)

The establishment of two Institutes of Applied Technology (IAT) in New South Wales, slated to open in 2023 emulates the Singaporean model. The NSW Government explained that:

... [the] IAT will not be a 'Super TAFE'. Nor will it be a 'dual sector' institution, offering vocational and higher education in separate streams. It will not take the place of university-based programs that already deliver foundation or bridging courses to higher education students. Rather, the IAT will be a 'single sector' tertiary institution. Through a number of colleges each focused on a particular industry, the IAT will embed and integrate practical and theoretical components of tertiary education throughout its curriculums. (Gonski and Shergold 2021, p. 11)

The new IAT-Digital will deliver a curriculum that incorporates big data, cyber security, artificial intelligence and cloud computing, while the IAT-Construction will focus on high-level skills aimed at professional workers in the construction industry, such as project management and leadership. Qualifications will be delivered at both IATs in partnership with universities and industry (NSW Department of Education nd). This education and training model demonstrates greater connection between the higher education and VET sectors and industry, as well as the recognition and incorporation of microcredentials into the formal qualification system.

Development of IATs will offer greater choice to students beyond the traditional, binary system of either VET or higher education (chapter 3). Drawing on the lessons from the NSW initiatives, other jurisdictions should begin to examine how they can develop tertiary institutes that combine VET and higher education content and industry expertise, subject to their own legislative and institutional frameworks.

The further growth of new institutional arrangements such as IATs will reveal whether the recently instituted reforms across the VET sector are shifting the sector from its narrow focus on defined skill sets to a model that, while still vocational in orientation, can accommodate more innovative models for delivery of less prescriptively-defined and more adaptable skills.



Recommendation 8.16

Improve VET teaching, pathways and partnerships

To ensure the successful implementation of Skills Reform, the Australian Government should:

- fund extra training and development programs for VET trainers and assessors so they can adequately perform independent and proficiency based assessment
- task the National Centre for Vocational Education Research to conduct a census of the VET workforce, focusing broadly on the characteristics of teachers at the provider level, including their pedagogical and occupational qualifications, as well as industry experience.

The Australian Government, together with State and Territory governments, should also continue to improve pathways between VET, higher education and industry.

- Other State and Territory governments should monitor and follow the example set by the New South Wales Government's Institutes of Applied Technology, and support local models of vocationally oriented tertiary education that deliver qualifications combining VET and higher education content together with industry expertise.

Appendices

A. A mixed story — performance of higher education

As noted in chapter 4, there are no simple indicators of the outcomes from teaching in universities. Aggregate outcomes, students' assessments of teaching quality, and the incentives for universities to teach to a high standard form a trio of incomplete indicators for the degree to which universities are likely to fulfill their teaching function. This appendix relates to the first two quantitatively-based indicators. While these have some nuanced elements, it is more straightforward to investigate them. In contrast, the conflicting incentives universities face are multitiered and complex and their resolution is a key instrument for achieving better outcomes, which is why they are addressed in the chapter.

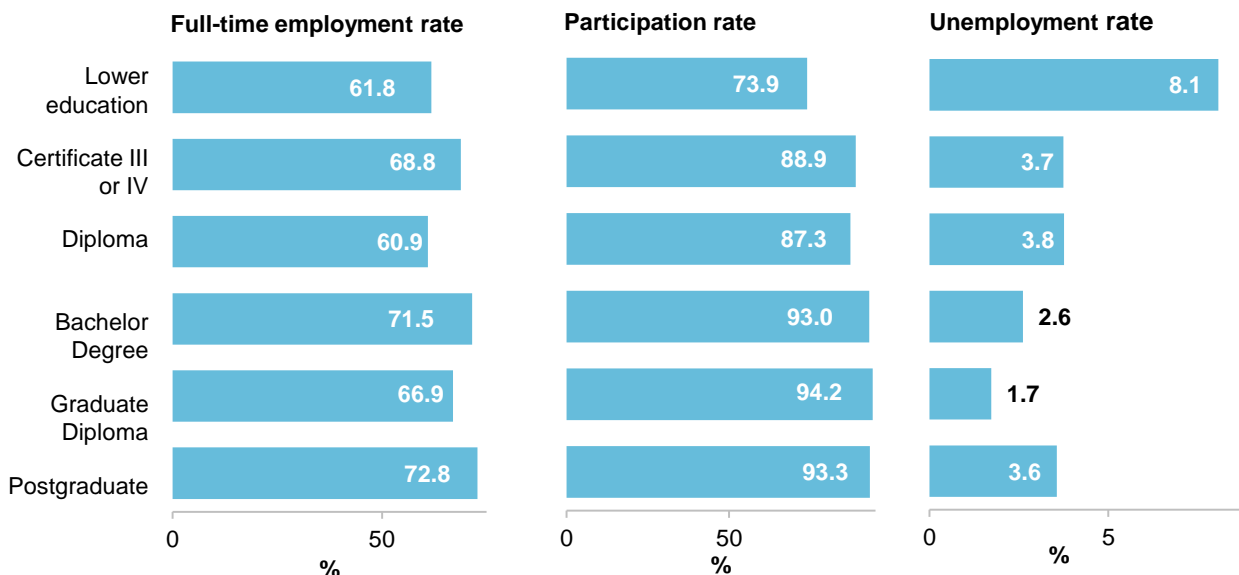
A.1 The quality of outcomes from university training are generally high

University graduates achieve higher rates of employment, experience lower unemployment rates and have higher labour force participation rates than those who acquire skills via VET or school alone (figure A.1). They are much more likely to earn more than \$1500 a week than non-university graduates (figure A.2). They are also more likely to work in the highest skill occupations that increasingly underpin productivity and economic growth. Students apply the skills they have acquired at university to their jobs, even if their occupations are in fields outside those studied — suggesting that university students acquire portable skills. Employer satisfaction rates with university graduates are also high (chapter 1).

However, not all of these correlations reflect what universities do. Variance in outcomes by educational attainment partly reflects that entry to university depends on academic and cognitive ability, which independently affects labour market outcomes. So too is the commitment by students to put aside three or more years to learning, much of it driven by their own motivation and passion, rather than the direct efforts of the institution they have enrolled in. The accreditation role of universities remains important, but that is different from the actions universities take to promote learning. These factors exaggerate the causal impact of providers on labour market outcomes.

Nonetheless, even after controlling for inherent ability and other confounders, university education — if completed — has large positive impacts on labour market outcomes of Australians compared with other forms of education (Marks 2018). While university has differential impacts on students with prior lower academic results and from 'equity' groups (such as students from lower socio-economic backgrounds), for many such groups, the value-added from university in Australia still compares favourably to alternative training (PC 2019; Zajac et al. 2021). Indeed, the favourable effects of higher education on labour outcomes is supported by a broader international literature (chapter 1). Against that background, Australian universities — as a whole — appear to be successful in raising average skill levels.

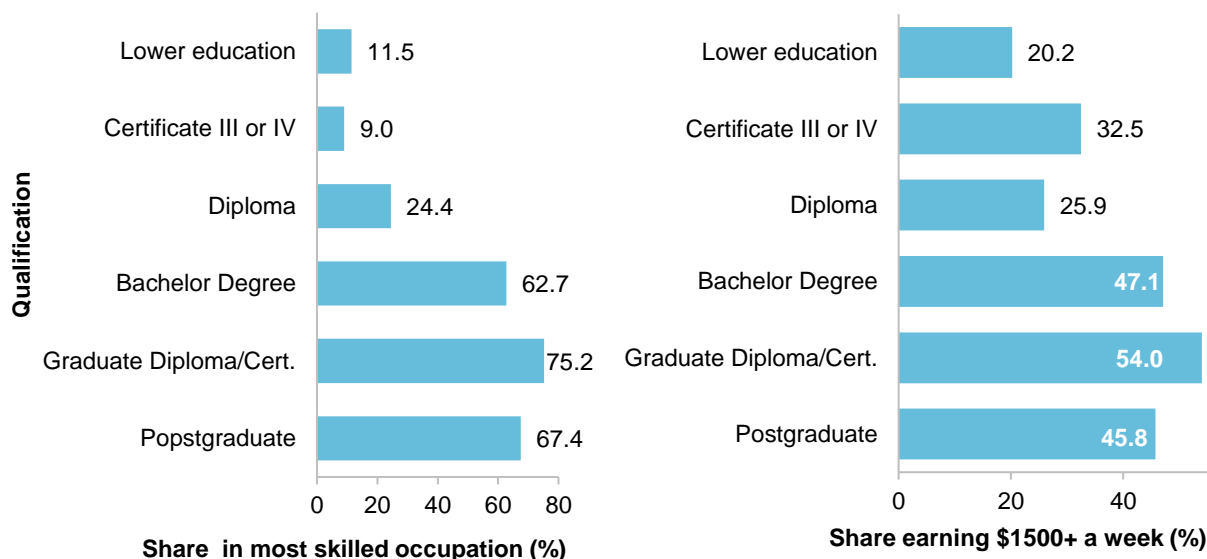
Figure A.1 – Key labour force outcomes are good for university graduates^a
People aged 25-34 years, not in education, 2021



a. The 25-34 year age range was selected because it will reflect job outcomes after some reasonable period after completion of studies, but exclude people whose training occurred in education systems that were different from those in recent times. The results only relate to people who are not currently attending an educational institution. Shares exclude people who did not indicate their labour market outcomes or educational attainment.

Source: ABS (*Census of Population and Housing: 2021*).

Figure A.2 – University graduates are faring well in labour markets^a
Weekly income and occupational skill levels of 25-34-year-old workers



a. See note for figure above.

Source: ABS (*Census of Population and Housing 2021*).

Trends in outcomes for university graduates tell a more nuanced story (Aungles, Hodgson and Parbery 2021). On the one hand, there are some indications that outcomes have worsened over time. For

instance, the full-time employment rate of undergraduates four months after graduation fell from above 80% in 1982 to just below 70% in 2020, and while unemployment rates for those with a bachelor or higher qualification have been typically below 4% from 1979 to 2020, the unemployment gap between VET and other qualifications have narrowed over time, and there has been a slight diminution in the median wage premium for bachelor degree over Certificate III/IV holders between 2004 and 2020.

On the other hand, full-time employment for undergraduates three years after completion of their degree fell only slightly over the ten years to 2020 and has even increased from 2015. And notwithstanding the short-term damaging effect of the Global Financial Crisis (GFC) on graduate outcomes, the longer-run growth in median incomes of the cohorts of graduates completing their studies since the GFC was surprisingly more rapid than the graduates completing their studies in the year before the GFC struck (Aungles, Hodgson and Parbery 2021, pp. 38–40).

The generally modest reduction in some labour market outcomes over time is unlikely to be evidence of a diminishing quality of university teaching, but due to a change in the mix of students. Over time, the share of young people entering university has greatly expanded, so the additional entrants have worse school results. Similarly, labour market conditions also vary over time, and are beyond the control of universities.

Similar issues confront assessing the value added by individual universities. At any given time, the differences in outcomes will only partly reflect the efforts of universities to impart skills to their students. The labour market outcomes of any given university depend on the prior academic ability of the students they attract, the vocational orientation of the institution and, crucially, the length of time considered. For example, the 2007 cohort of bachelor graduates of the University of Sydney earned substantially less in 2009 than the more vocationally-oriented graduates from the University of Technology Sydney and the University of Notre Dame but had significantly higher earnings by 2018. This partly reflects that bachelor's graduates in less vocationally-oriented universities are more likely to engage in further study, which limits their short-term incomes. Their earnings may also be more responsive to experience. Overall, the empirical evidence suggests that the university of origin explains only about 2% of the variation in long-run median university graduate incomes (Aungles, Hodgson and Parbery 2021, pp. 41–54).¹²⁴

Once many student outcomes depend on luck in labour markets, preferences for certain types of jobs and unobserved aspects of students that also affect salaries such as their motivation levels, the more difficult it is to causally ascribe outcomes to the teaching efforts of universities. As discussed further in chapter 4, this is the key challenge facing the implementation a workable performance-based funding model.

A.2 The quality of the university experience

Prima facie, improvements in the quality of university education, and particularly teaching quality, could be expected to increase:

- students' skills, which raises their future employment, productivity and wages
- the quality of the university experience, which has separate value, including in attracting people to undertake tertiary education in the first place
- student completion rates, by raising competency and confidence in students who are struggling, which enables some students to obtain a qualification they would otherwise have forgone.

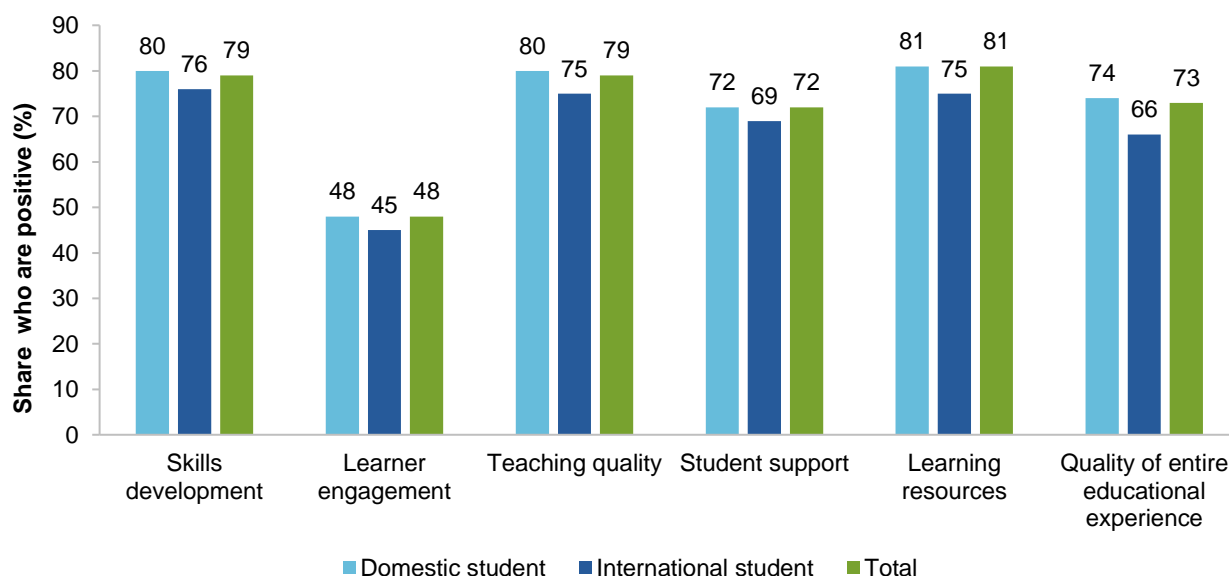
¹²⁴ Even after controlling for the study area, full-time or part-time study and student traits (such as gender, age group, ATAR, and location) and the study area, more than 85% of the variation in long-run graduate incomes remains unexplained.

There are few attempts at objectively assessing teacher quality. Observational studies using proven instruments for assessing quality are rare and costly. Therefore, evaluating the size of the effects must rely on student perceptions of their experiences at university.

The subjective evidence of students’ perceptions points to reasonably good performance. About 80% of domestic university undergraduates rated teaching quality, skills development and learning resources positively. However, student support (about 70%) and learner engagement (less than 50%) were less well rated (figure A.3).¹²⁵ In general, domestic students rate the performance of universities higher than international students, but not by much.

The particularly poor outcomes for learner engagement reflects the effects of COVID-19. By forcing students into online learning, the pandemic had adverse impacts student interaction outside study and opportunities to interact with local students, which are key elements of learner engagement. (The rating fell by more than 15 percentage points between 2019 and 2020). The challenge of online learning is discussed further in chapter 4.

Figure A.3 – Undergraduate perception of the key domains of university performance, 2021



Source: SRC (2022c).

Surprisingly, there was no significant reduction in perceived teaching quality or skills development associated with the pandemic — the domains likely to be most strongly related to the capacity of universities to produce good outcomes (figure A.4). Moreover, the mediocre rating of the overall university experience in 2020 and 2021 is likely to be a temporary effect of the pandemic, and already shows improvement as on-campus classes rise.

It is also notable that very few students gave poor ratings for the key items. For instance, among universities, less than 4% of undergraduate students rated the overall quality of teaching as poor in 2021 (covering both domestic and international students) and just over 5% rated their overall experience at university as poor.¹²⁶

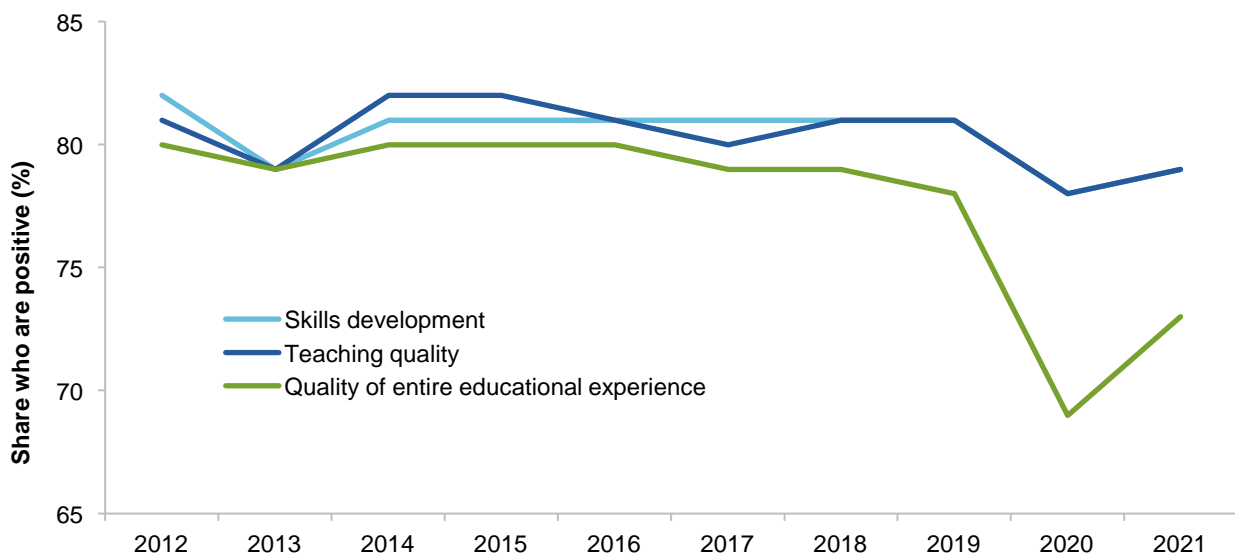
¹²⁵ Depending on the domain, a positive response is where students nominate Quite a bit/Very much on a 5-point Likert scale of Not at all/Very little/Some/Quite a bit/Very much, or Good/Excellent on a scale from Poor/Fair/Good/Excellent.

¹²⁶ Based on unpublished QILT data analysed by the Commission.

Nevertheless, to the extent that students' perceptions are accurate, these estimates still point to considerable wasted resources and opportunities.

An encouraging facet of university performance across the key broad categories of a quality education is that the variation in average outcomes for undergraduates from different demographic groups is very low with the exception of learner engagement (SRC 2022b, pp. 8–10).¹²⁷ This suggests that universities are achieving reasonably consistent outcomes for a wider range of student types, which is important as diversity in the student body increases.

Figure A.4 – Undergraduates' perceptions of quality^a
Universities and non-university higher education institutions, 2021



a. Non-universities were included from 2015, but given score similarities in overlapping years, is unlikely to invalidate the longer trend analysis. Results include international students.

Source: SRC (2022b).

Granular results point to some mediocrity

At the more granular level, university undergraduates' perceptions of the effectiveness of universities' capabilities to develop skills and teach were more mediocre than their overall higher impressions (tables A.1 and A.2). For instance, feedback is an essential element of effective teaching and the efficient acquisition of skills, but nearly half of students rated this as only happening sometimes, or not much or not at all.

¹²⁷ Among other student traits, this includes gender, first in family status, age, ethnicity, international student status and socio-economic status. For four of the five categories of quality, there is only a one or two percentage point variation in positive ratings across different student groups. The greater variation in learner engagement is solely due to the much lower positive ratings for students who are solely studying remotely from the university.

Table A.1 – Undergraduate perceptions of the effectiveness of skill development^a
Universities, 2021

Skill type	Positive rate (%)	Change from 2020
Developed critical and analytical thinking	70	up
Developed ability to solve complex problems	61	same
Developed ability to work effectively with others	59	up
Developed confidence to learn independently	72	same
Developed written communication skills	64	up
Developed spoken communication skills	52	up
Developed knowledge of field studying	76	same
Developed work-related knowledge and skills	62	up

a. A positive response is where students nominate Quite a bit/Very much on a 5-point Likert scale of Not at all/Very much/Some/Quite a bit/Very much. The results relate to domestic and international students.

Source: SRC (2022c).

Table A.2 – Undergraduate perceptions of teaching quality^a
Universities, 2021

Aspect of performance	Positive rate (%)	Change from 2020
Study well-structured and focused	65	up
Study relevant to education as a whole	73	up
Teachers engaged you actively in learning	63	up
Teachers demonstrated concern for student learning	59	down
Teachers provided clear explanations on coursework and assessment	67	up
Teachers stimulated you intellectually	67	up
Teachers commented on your work in ways that help you learn	54	up
Teachers seemed helpful and approachable	70	same
Teachers set assessment tasks that challenge you to learn	77	same
Overall quality of teaching	77	up
Quality of entire educational experience	73	up

a. A positive response for the first nine aspects is where students nominate Quite a bit/Very much on a 5-item Likert scale of Not at all/Very much/Some/Quite a bit/Very much. For the quality items (10 and 11), a positive response is where the student nominates the aspect as Good/Excellent from a 4-item Likert scale of Poor/Fair/Good/Excellent. The results relate to both domestic and international students. The overall assessment score for teaching and the entire student experience is not an average of individual assessments, but a holistic assessment by students.

Source: SRC (2022c).

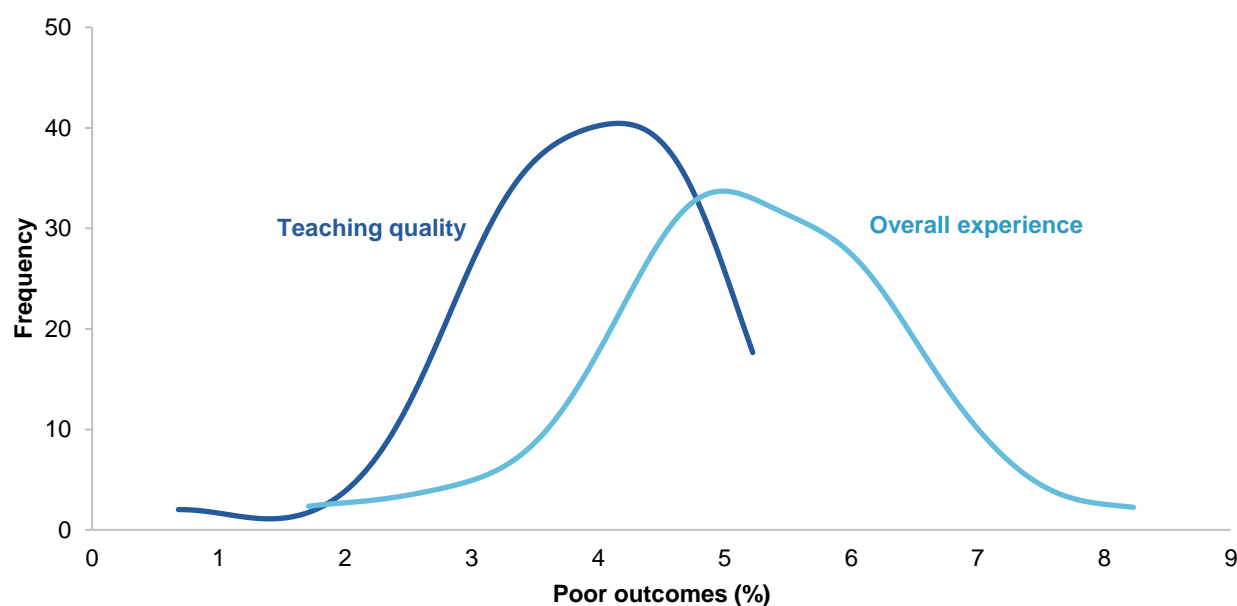
There are sizeable variations in performance between universities

There is considerable variation in the performance across universities on key domains of their educational functions (figure 4.2 in chapter 4). Deeper analysis shows that the differences in the overall quality of teaching between universities is the most influential determinant of the variations between them in students' perceptions of the overall quality of the entire educational experience, although student support and

resources play a residual role.¹²⁸ Perceptions of skills development do not have any independent effect on differences in overall perceived educational quality and are largely determined by perceived teaching quality.

The variations between universities mainly appear to reflect the extent to which they are mediocre rather than poor in undertaking their key functions as the degree of variance in poor ratings is relatively low (figure A.5).

Figure A.5 – Distribution of poor ratings of education quality across universities, 2021^a



a. Densities estimates are based on a Gaussian kernel.

Source: Unpublished QILT data from the Social Research Centre.

Perceptions and outcomes are only partly related

While students' *perceptions* of skill acquisition are linked to *perceived* overall teaching quality, the evidence suggests that subjective assessments of teaching quality have weaker links to actual labour market outcomes. For instance, while figure 4.2 in chapter 4 shows considerable variation between universities in all of the various domains of educational quality, graduate outcomes data show far smaller differences in medium-term full- and part-time employment outcomes (SRC 2022d).

Across universities, a 10% increase in average perceived teaching quality is associated with about a 1% increase in full-time graduate employment three years later, but with a level of imprecision that would not even rule out a negative impact.¹²⁹ The relationship is negative for graduate salaries — a clearly spurious

¹²⁸ These results are based on analysis of student ratings across universities, and so seeks to explain the variations in the overall ratings at the university level. This analysis is relevant to any model of performance-based funding. Further analysis — not undertaken — could use student level data. This could inform the determinants of student ratings of their overall university experiences for each university and whether these were uniform across universities (which, given the nature of their student intakes and varying vocational orientation, is unlikely). This is a fruitful area for future analysis.

¹²⁹ Alternatively, a one standard deviation increase in teaching quality increased the full-time employment rate by about 0.3 percentage points, although this estimate has a wide confidence interval. These results are based on Commission

result. This replicates the results of global research, which typically find immaterial and sometimes negative links between subjective student satisfaction ratings and labour market outcomes (Falch et al. 2022). This suggests risks in using subjective measures of satisfaction in performance-funding or in informing new students about the relative career outcomes they might expect from the tertiary pathway they might choose.

However, this does not mean that teaching quality is unimportant. It may just mean that the subjective measures of quality are too simplistic to capture all of the facets of teachers that influence outcomes. Even on face validity grounds alone, it seems very unlikely that an excellent university teacher would raise skills by the same amount as a poor teacher. If the outcome of effective teaching is to raise post-graduation incomes per student by even a small amount (say just 1%) for a given university then across all the students enrolled, the economy-wide benefit is many hundreds of millions of dollars per year.¹³⁰ This large effect may be hard to detect when looking at the average outcome per student given all of the other determinants of labour market outcomes.

Furthermore, in school settings, there is compelling evidence that higher levels of teacher competence lead to significantly higher levels of student achievement (Hanushek 2011). Indicative estimates suggest that a teacher who is one standard deviation above the average teacher (in terms of their ability to increase student achievement), instructing a classroom of 15 students, could increase the average lifetime earnings of the classroom by about \$530 000 in a given year; or about \$35 000 per student (PC 2023, pp. 333–334). It would be remarkable that an effect that was clear in one learning environment had entirely vanished several years later in another learning environment.

In addition, students' subjective assessments are still likely to affect the quality of their university experience and the likelihood that they will continue their studies. Nearly one fifth of students who considered early departure cited quality concerns as the reason for doing so, and about one quarter claimed that their expectations were not met (SRC 2022b, p. 29). So, while these are subjective assessments, they matter for behaviour.

Finally, the quality of a person's education may have longer-run non-economic effects on students — such as how they relate to people, their personal interests, and networks.

analysis of QILT student ratings across universities in 2018 and graduate outcomes for the same cohort three years later. The result is only indicative because it does not control for any aspects of universities (such as their location, the mix of courses, and the nature of the student intake).

¹³⁰ Based on some indicative calculations by the Commission, drawing on shifts in the Mercer equation for lifetime earnings.

B. Stylised simulations of economy-wide effects

The Productivity Commission used a whole-of-economy model to illustrate the potential effects of some of the recommendations in this report in a stylised way. This model is static, in that it does not capture dynamic effects over time. Rather, the results are interpreted as if the effects of a shock to the economy could happen overnight. While the simulations are stylised and there is a high level of uncertainty in the impacts of the proposed recommendations and other model assumptions, the simulations provide insight on how potential productivity improvements could flow through the economy's structure and the differential impacts across industries and household types. Further details of the model, simulations and effects of sensitivity testing are contained in this inquiry's companion volume '*Whole-of-economy modelling*'.

Improving school education quality¹³¹

The model was used to run three simulations to illustrate the potential effects of improving the quality of school education — one simulation to illustrate the 'short run' effects, and subsequent simulations for 'long run' and 'very long run' effects.¹³²

- The short run impact was an immediate improvement in the labour productivity of workers in the 'school education' industry, modelled in this simulation as a 3% productivity increase as a result of better use of curriculum resources to save teachers' time and improve practices, as well as better integration of technology within classrooms.
- The long run illustrates the economic impacts once school quality improvements have resulted in more productive workers in the first group of school leavers that will initially benefit from better school quality, via a 2% increase in the labour productivity of 15-24 year old workers. This effect occurred on top of the short run impact.
- In the very long run, all workers that have completed school will have done so in the improved system, so it is assumed that the 2% labour productivity improvement applies to all labour types. This effect occurred on top of the short run impact.

For all these simulations, labour use (as measured by hours worked) in the 'school education' industry was assumed to be fixed. It was assumed that reforms to improve school education quality would not change the

¹³¹ Referred to as simulation 5 in this inquiry's companion volume '*Whole-of-economy modelling*'.

¹³² It has been assumed in all three scenarios that the time horizons were sufficient to allow the capital stock to grow and to move flexibly between industries, despite the assumption of a fixed capital stock being common in short run simulations.

hours worked by teachers and other workers in the 'school education' industry, but that those hours would be more productive.¹³³

Short run

Simulating increased labour productivity in 'school education' led to an estimated reduction in the relative price of 'school education', as the relative cost of producing a unit of 'school education' was reduced.¹³⁴ In most industries, such a change would lead to an increase in production and output. However, schooling is a special case whereby the amount of schooling delivered in the economy meets population demands (the model does not incorporate any population changes, which means there is no source for changing demand). The resulting change can therefore be interpreted as improvements to the quality of education delivered, at a relatively lower cost. In order to produce the increased quality, there is also a corresponding increase in capital in the model.

In this simulation, wage rates and capital rental prices both increased relative to the economy-wide CPI, so household incomes increased as a result of increased labour and capital income.

The effects on the quantity of output produced by other industries varied depending on relative changes in consumption by different users. Domestically, household consumption of commodities other than 'school education' increased. While these other commodities experienced relative price increases due to increased input costs, which induced lower demand, this effect was more than offset by the increased demand arising from higher household incomes. But internationally, for more export-intensive industries such as 'agriculture, forestry and fishing', 'mining', 'advanced manufacturing' and 'other manufacturing', the increased input costs made these commodities less competitive in the foreign market, which led to an overall decrease in these industries' real output and reduced labour in these industries.

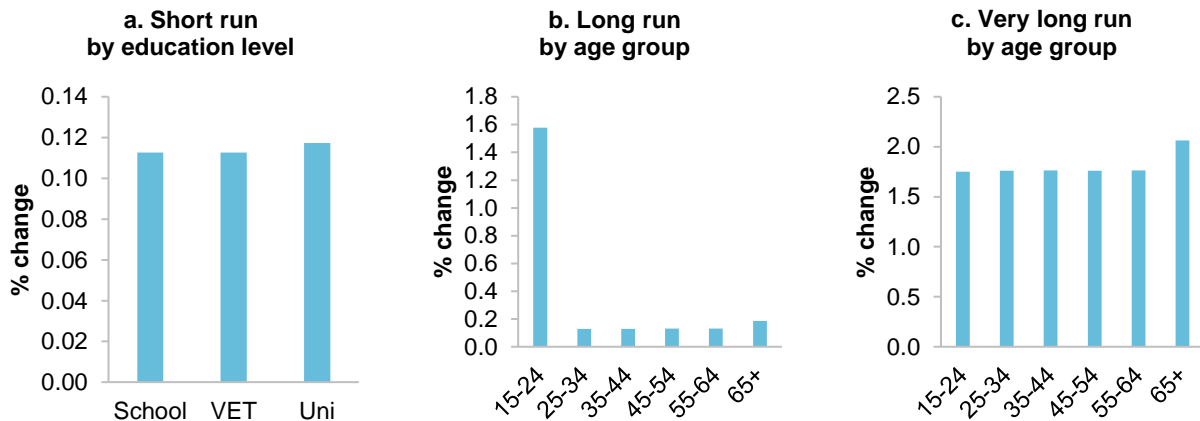
Real GDP and real gross national income (GNI) increased by 0.08%. Sensitivity testing found that the real GDP increase ranged from 0.05% to 0.11% under different assumptions about the size of the labour productivity shock for the 'school education' industry (chapter 4 of this inquiry's companion volume '*Whole-of-economy modelling*').

Household wellbeing increased, reflecting increased consumption and leisure, as labour use across the economy fell slightly. The value of this increase was estimated to be \$1.4 billion in aggregate in 2018-19 dollars (that is, if this amount was given as extra income instead of the productivity shock, households would be as well off as they were estimated to be after the productivity shock). University-educated workers had slightly higher increases in real wages rates (that is, wages relative to the CPI) (figure B.1, panel a). These relative wage effects were observed because the 'school education' industry largely employed university-educated labour, and the assumption that labour in that industry is fixed (rather than being able to be redeployed to other industries) led to greater upward pressure on their wages.

¹³³ Separate simulations that were run without fixing labour in the 'school education' industry resulted in labour being reallocated to other industries. This occurred because the model was built on relationships in the market sector where productivity improvements typically result in a reallocation of resources toward their most efficient use. 'School education', however, is a non-market service, and productivity improvements are unlikely to lead to workforce reductions, but rather would improve the quantity or quality of outputs while retaining the workforce.

¹³⁴ 'School education' is a non-market service in which prices generally do not significantly affect the amounts produced or consumed. The price changes for 'school education' in this simulation merely represent the mechanics of the CGE model (which was structured based on market sector relationships).

Figure B.1 – Estimated changes in real wage rates by select labour groups across short run, long run and very long simulations of improved school quality



Source: Productivity Commission estimates.

Long run

In addition to the short run impacts on the ‘school education’ industry discussed above, the long run improvements to labour productivity for 15-24 year old workers saw producers substituting toward these labour types due to their higher productivity. This led to an overall increase in hours worked by 15-24 year old groups, and a decrease for older age groups, particularly those aged 55 and over. Real wage rates increased for all age groups relative to the economy-wide CPI, but real wage rates for 15-24 year old groups increased the most (figure B.1, panel b).

Labour use decreased in the ‘retail’ and ‘hospitality’ industries as these industries most heavily utilised 15-24 year old labour. This decrease was because more output could be produced with the same amount of labour, which more than offset the additional labour required to meet the increase in demand for ‘retail’ and ‘hospitality’ goods and services (arising from higher household incomes and therefore consumption). Changes in labour use in other industries was mixed, with the overall effect on hours worked in the economy largely unchanged.

Almost all industries increased their quantity of output produced, due to the benefits of improved labour productivity. Investment and the capital stock also increased to meet requirements for capital for increased production, and the relative price of capital rental increased.

Real GDP and real GNI increased by 0.2% (which includes the more immediate effects of improvements in labour productivity in the ‘school education’ industry, discussed above), through increases to real consumption, investment and government expenditure. Sensitivity testing found that the real GDP increase ranged from 0.1% to 0.3% depending on assumed changes to the labour productivity shock simulated (chapter 4 of this inquiry’s companion volume ‘*Whole-of-economy modelling*’).

Household wellbeing increased due to increased consumption and increased leisure for older age groups, and the estimated value of this wellbeing increase was about \$2.8 billion in 2018-19 dollars in aggregate. Consumption inequality decreased slightly as the 15-24 year old labour groups, who initially had lower consumption, experienced relatively higher real wage rate increases and hence were able to increase their consumption by a greater extent.

Very long run

In the very long run, labour productivity improvements through improved schooling were assumed to flow through to all age groups, in addition to the continued impact of improved labour productivity in the ‘school

education' industry from the short run changes. All industries increased their quantity of output produced as a result of the productivity improvements. Total hours worked was largely unchanged, and the capital stock increased to support growth in production.

Hours worked increased slightly across most age groups, but decreased for retirement aged workers, whose choice of labour supply was calibrated in the model to be more responsive to changes in income. Household consumption nevertheless increased for all groups because of increases in real labour and capital incomes, through real wage rate rises for all age groups (figure B.1, panel c), and relative increases in the capital rental price and amount of capital held by households. These increases in income were partly offset by increased saving and income taxes.

Real GDP increased by 2.0%, and real GNI increased by 2.1%, with increases to real consumption, investment and government expenditure (including the more immediate effects of improvements in labour productivity in the 'school education' industry, discussed above). Sensitivity testing found that the real GDP increase ranged from 1.0% to 3.0% under different assumed labour productivity improvements (chapter 4 of this inquiry's companion volume '*Whole-of-economy modelling*'). Household wellbeing increased as a result of increased real incomes (and thus consumption), and increased leisure among some labour groups. Consumption inequality decreased slightly as labour productivity improvements were shared more broadly across all labour types.

Increasing tertiary education graduates to meet increasing needs for skilled labour¹³⁵

The model was used to illustrate the potential effects of measures that would increase the supply of tertiary education graduates to address increasing needs for skilled labour in the Australian economy. This could, for example, arise from proposed reforms that lift participation in university education and qualification completion rates, with younger age groups being more likely to graduate sooner and hence benefit from the reforms.¹³⁶

The impacts of proposed reforms were simulated by changing the composition of the population toward more university-educated people among the 15-24 year old group. It was assumed that among 15-24 year old groups, there was a 10% increase in numbers of people who are university-educated, a 4% fall in those who are VET-educated, and the remaining compositional shift absorbed by a fall in school-educated people. That is, the total number of people in the population remained the same, but they were more highly educated on average.

The increase in supply of university-educated labour resulted in the real wage rates of university-educated groups falling (that is, wage rates decreased relative to the economy-wide consumer price index (CPI)). Real wage rates of the university-educated 15-24 year old group fell the most, and real wage rates of older university-educated groups fell slightly too because producers were able to substitute toward the less scarce younger university-educated group. This, in turn, resulted in decreases in average consumption by university-educated people. The real wage rates of school- and VET-educated groups increased because these labour types were relatively more scarce, and labour of different education levels was assumed to be less substitutable than labour of different age or sex groups. Although the size of the gap in wage rates

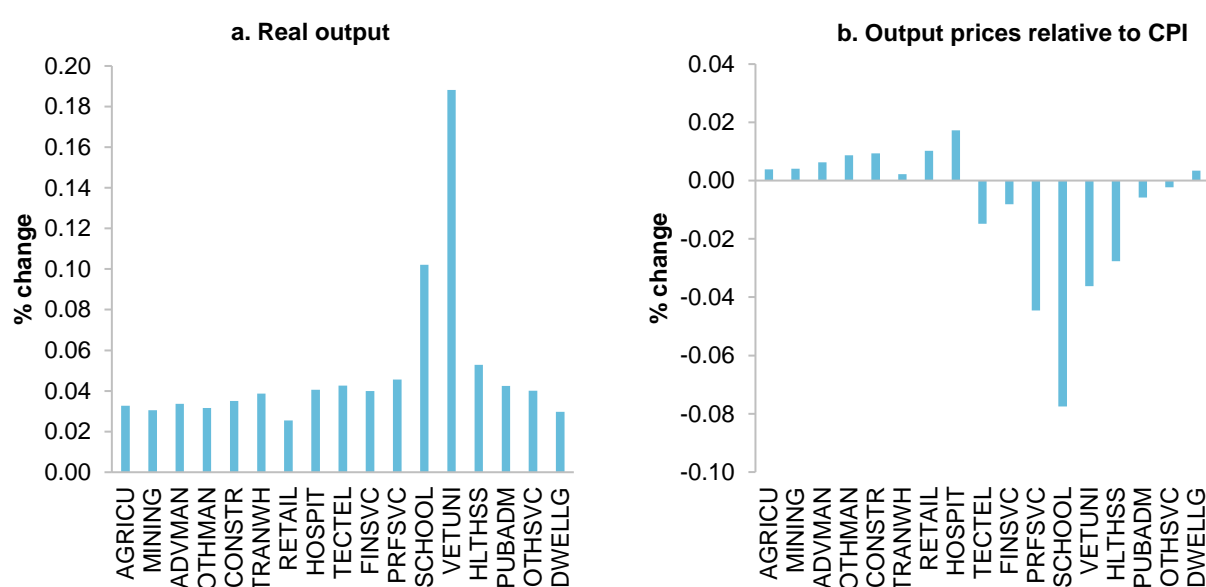
¹³⁵ Referred to as simulation 3 in this inquiry's companion volume '*Whole-of-economy modelling*'.

¹³⁶ In the absence of these reforms to increase university-educated labour supply to meet increasing demand for skilled labour, there would be a shortage of skilled labour at original wage levels and eventually, assuming the economy can adjust, an increase in the market-clearing wages of university-educated labour. This was verified in a separate simulation in which demand for university-educated labour was increased through increasing the factor share associated with university-educated labour, and reducing that associated with other types of labour, in industry production functions.

decreased between university-educated workers and workers with lower education levels, the wage rates of university-educated workers were still higher than for other workers.

Industries that used relatively more university-educated labour in their production process (such as education industries, ‘professional, scientific and technical services’ and ‘health and social services’) were better able to benefit from the increase in supply of university-educated labour to produce more output at lower prices relative to the economy-wide CPI (figure B.2).¹³⁷ Other industries tended to experience relative price increases (figure B.2, panel b), partly because of higher labour costs (arising from substitutions away from more scarce non-university-educated labour toward relatively more costly university-educated labour, and relative wage rises for non-university-educated labour).

Figure B.2 – Estimated changes in real output and output prices by industry due to increasing tertiary education graduates^a



a. Industry abbreviations: AGRICU – agriculture, forestry and fishing; MINING – mining; ADVMAN – advanced manufacturing; OTHMAN – other manufacturing; CONSTR – construction; TRANWH – transport and wholesale; RETAIL – retail trade; HOSPIT – hospitality; TECTEL – technology and telecommunications; FINSVC – financial services; PRFSVC – professional, scientific and technical services; SCHOOL – school education; VETUNI – technical, vocational and tertiary education; HLTHSS – health and social services; PUBADM – public administration; OTHSVC – other services; DWELLG – ownership of dwellings.

Source: Productivity Commission estimates.

Nevertheless, output still increased across all industries due to increased demand (figure B.2, panel a). Demand from the household sector increased because the rise in consumption for non-university-educated groups (due to real wage rate rises) exceeded falls in consumption from university-educated groups, and because of the simulated compositional changes (a shift from school- and VET-educated young people on lower incomes to university-educated young people earning higher incomes means that young people in aggregate enjoy greater consumption, all else equal).

¹³⁷ In reality for the ‘school education’ industry, the amount of schooling delivered meets population demands (which are not modelled) and school education is not explicitly priced in the public sector. The simulated changes for this industry can therefore be interpreted as improvements to the quality of education delivered, at a relatively lower cost. This is discussed further above in the simulation examining improvements to school education quality.

Relative capital rental prices also increased due to increased demand for capital from growth in production, and the fact that industries that experienced relative price reductions were not used heavily by the investment sector.

Real GDP and real GNI increased by about 0.04% under this simulation, but sensitivity testing found that the effects varied with changes to the model assumptions. For example, some changes to the size of the assumed increase in university-educated people led to real GDP increases from 0.03% to 0.06% (chapter 4 of this inquiry's companion volume '*Whole-of-economy modelling*').

Improving tertiary education quality¹³⁸

The model was used to run two simulations to illustrate the potential effects of recommendations to improve the quality of tertiary education — one stylised representation of 'long run' effects and another of effects in the 'very long run'.¹³⁹

- The long run illustrates the economic impacts once quality improvements have resulted in more productive workers in the age groups that are more likely to graduate (and therefore benefit from improved tertiary education quality) sooner, via a 2% increase in the labour productivity of university-educated 15-24 and 25-34 year old labour.
- In the very long run, all workers that have completed tertiary education will have done so in the improved system, so it is assumed that the 2% labour productivity improvement applies to all university-educated labour types, regardless of age.

Long run

The increase in productivity for university-educated 15-24 and 25-34 year old workers resulted in their real wage rates (that is, wages relative to the economy-wide CPI) increasing relatively more than other labour groups. Real wage rates for other university-educated age groups fell slightly on average as the 15-24 and 25-34 year old labour groups were preferred due to their increased productivity. Aggregate real wage rates increased slightly and hours worked fell slightly.

Increased labour productivity meant that industries could produce more output with the same amount of labour. All industries increased their quantity of output produced. However, output price effects relative to the economy-wide CPI varied across industries, reflecting several factors — including relative wage rate changes due to the increased labour productivity, each industry's relative use of 15-24 and 25-34 year old workers, and the change in demand for goods and services. Industries that used relatively more university-educated 15-24 and 25-34 year old workers (such as 'school education' and 'professional, scientific and technical services') benefited more from their improved productivity, which led to an overall decrease in their relative prices. However, industries that used relatively little labour from university-educated 15-24 and 25-34 year old workers (such as 'other manufacturing', 'construction' and 'transport and wholesale'), or that relied heavily on capital (such as 'agriculture, forestry and fishing' and 'mining'), experienced a relative increase in their output prices, because the improved labour productivity had less of an effect.

The increase in output across all industries meant an increased need for capital, leading to increased investment and a larger capital stock. Capital rental prices increased in relative terms as well, due to the relative price of investment increasing.

Households increased their consumption across all commodities in real terms, and real exports and government consumption also increased. Real GDP increased by about 0.2% and real GNI increase by about 0.3% under this

¹³⁸ Referred to as simulation 4 in this inquiry's companion volume '*Whole-of-economy modelling*'.

¹³⁹ It has been assumed in both scenarios that the time horizons were sufficient to allow the capital stock to grow and move flexibly between industries.

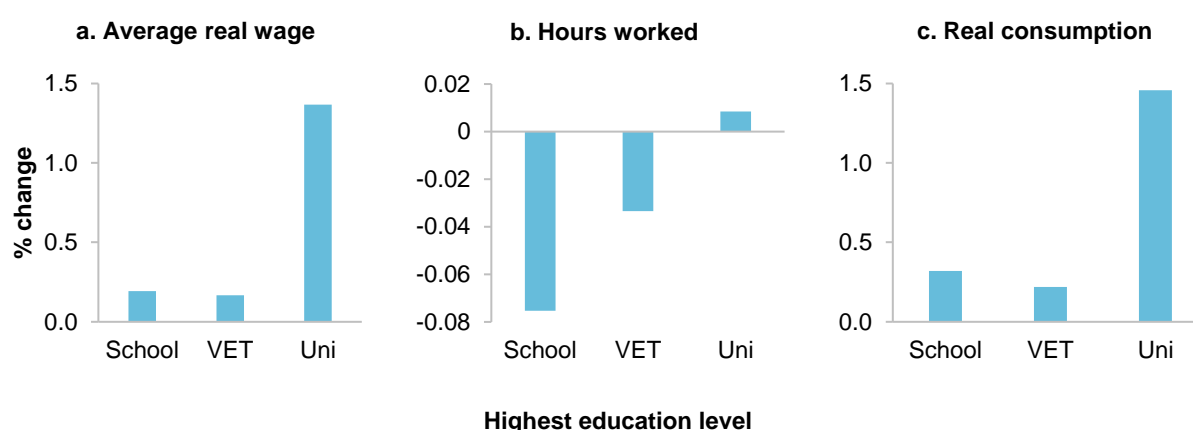
simulation. However, sensitivity testing found that the real GDP effect ranged from 0.1% to 0.5% with changes to the assumed labour productivity improvement, indicating some uncertainty about these figures. Household wellbeing (as measured by a combination of consumption and leisure time) increased as households had higher labour incomes and were able to consume more, and some groups increased their leisure time. The value of the wellbeing improvement was estimated to be worth about \$2.5 billion to households in aggregate in 2018-19 dollars (that is, if this amount was given as extra income instead of the productivity shock, households would be as well off as they were estimated to be after the productivity shock). Consumption inequality increased slightly as the benefits of the shock predominantly flowed to university-educated workers, who were generally more highly paid and initially had higher consumption on average.

Very long run

The increase in productivity across all university-educated workers increased demand for this type of labour relative to other types, which increased their real wage rates (figure B.3, panel a). The real wage rates of VET- and school-educated labour also increased, albeit by a smaller amount. The greater real wage increase for university-educated workers resulted from industries substituting toward more productive university-educated workers. Hours worked by university-educated labour increased while hours worked decreased for VET- and school-educated labour (figure B.3, panel b).

Real consumption increased across all individual groups (figure B.3, panel c), with increases in labour and capital incomes exceeding increases in saving and taxes in real terms. On labour incomes in particular, university-educated workers saw increased real wage rates and hours worked. VET- and school-educated labour types also saw increased incomes and consumption even with a decrease in their hours worked, as real wage rates for these labour types increased. Similar to the long run simulation, household wellbeing increased (as both consumption and leisure time for some groups increased), with the improvement valued at \$8.4 billion in aggregate in 2018-19 dollars. There was a slight increase in consumption inequality, as the university-educated labour groups who benefited from relatively larger consumption increases also initially had higher consumption on average than other groups.

Figure B.3 – Estimated changes in average real wage rate, hours worked and real consumption by education level due to improved tertiary education in the very long run

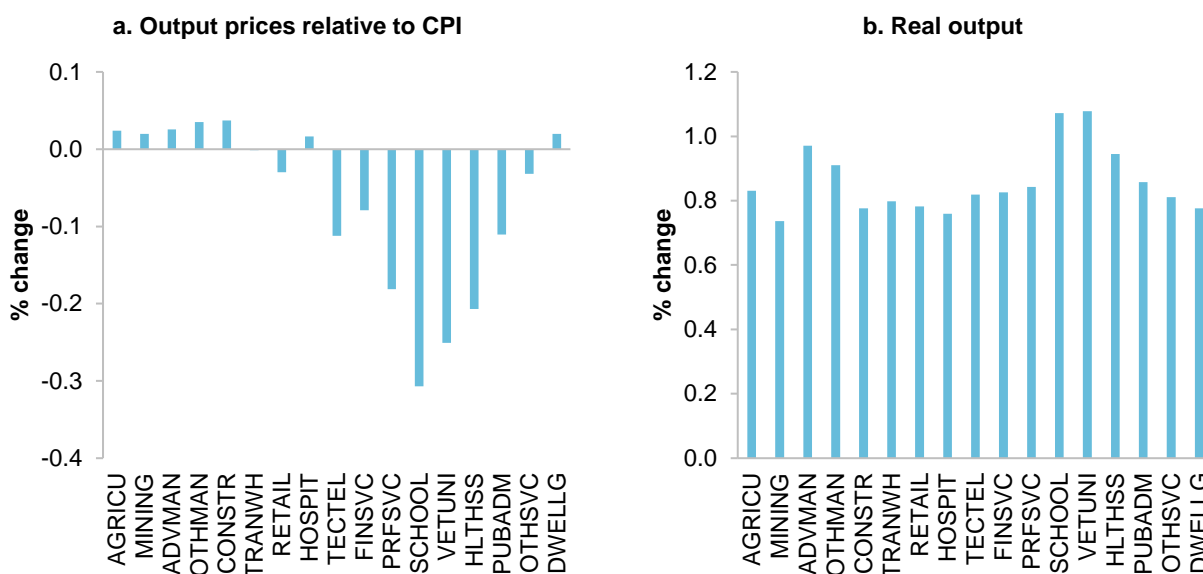


Source: Productivity Commission estimates.

Similar to the long run simulation, output price changes relative to the economy-wide CPI varied. Industries that saw a relative price increase included 'agriculture, forestry and fishing', 'mining', advanced manufacturing', 'other manufacturing', 'construction', 'hospitality' and 'ownership of dwellings', and other industries experienced relative price decreases (figure B.4, panel a). Real output increased across all industries as the increased labour productivity of all university-educated workers meant more output could be

produced with the same level of labour (figure B.4, panel b). More capital was also required to produce this increased output, so investment and the capital stock increased, while the relative price of investment and capital rental increased. Economy-wide, real GDP increased by about 0.8% and real GNI increased by about 0.9% under this simulation. Sensitivity testing found that the real GDP effect ranged from 0.4% to 1.6% under different assumed productivity improvements.

Figure B.4 – Estimated changes in output prices and real output by industry due to improved tertiary education in the very long run^a



a. Industry abbreviations: AGRICU – agriculture, forestry and fishing; MINING – mining; ADVMAN – advanced manufacturing; OTHMAN – other manufacturing; CONSTR – construction; TRANWH – transport and wholesale; RETAIL – retail trade; HOSPIT – hospitality; TECTEL – technology and telecommunications; FINSVC – financial services; PRFSVC – professional, scientific and technical services; SCHOOL – school education; VETUNI – technical, vocational and tertiary education; HLTHSS – health and social services; PUBADM – public administration; OTHSVC – other services; DWELLG – ownership of dwellings.

Source: Productivity Commission estimates.

Abbreviations

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACL	Australian Consumer Law
ACARA	Australian Curriculum, Assessment and Reporting Authority
AERO	Australian Education Research Organisation
AITSL	Australian Institute for Teaching and School Leadership
AQF	Australian Qualifications Framework
ARC	Australian Research Council
ASQA	Australian Skills Quality Authority
ATAR	Australian Tertiary Admissions Rank
CBT	Competency-based training
CGS	Commonwealth Grant Scheme
CPI	Consumer Price Index
CSP	Commonwealth supported place
DESE	Department of Education, Skills and Employment
DEWR	Department of Employment and Workplace Relations
EFTSL	Equivalent full-time student load
FTE	Full-time equivalent
GDP	Gross Domestic Product
GST	Goods and Services Tax
GUG	Good Universities Guide
HALT	Highly Accomplished and Lead Teachers
HECS	Higher Education Contribution Scheme
HELP	Higher Education Loan Program
HERD	Higher Education Research and Development
HEPPP	Higher Education Participation and Partnerships Program
IAT	Institute of Applied Technology
ICL	Income-contingent loan
IRLSAF	Indigenous, Regional and Low-SES Attainment Fund
ITPA	Independent Training Package Assurance

JRG	Job-Ready Graduates [Higher Education Support Amendment (Job-ready Graduates and Supporting Regional and Remote Students) Bill 2020]
JSC	Jobs and Skills Council
MOOCs	Massive open online course
MBGA	Maximum Basic Grant Amount
MFP	Multifactor productivity
NAPLAN	National Assessment Program — Literacy and Numeracy
NSRA	National School Reform Agreement
NASWD	National Agreement on Skills and Workforce Development
NCSEHE	National Centre for Student Equity in Higher Education
NCVER	National Centre for Vocational Education Research
NSC	National Skills Commission
NTEU	National Tertiary Education Union
OECD	Organisation for Economic Co-operation and Development
PBF	Performance-based funding
PCS	Provider Category Standards
PISA	Programme for International Student Assessment
QILT	Quality Indicators for Learning and Teaching
RTO	Registered training organisation
SES	Socio-economic status
SEIFA	Socio-Economic Indexes for Areas
STEAM	Science, Technology, Engineering, the Arts and Mathematics
TAFE	Technical and Further Education
TEQSA	Tertiary Education Quality and Standards Agency
TERS	Teaching Excellence Research Scheme
UAC	Universities Admissions Centre
UK	United Kingdom
US	United States of America
VET	Vocational Education and Training
VFH	VET FEE-HELP
VSL	VET Student Loans

References

- 3P Learning 2014, *How Does Mathematics Reward Great Performance?*, <https://www.3plearning.com/blog/mathletics-reward-great-performance/> (accessed 15 June 2022).
- ABS (Australian Bureau of Statistics) 2006, *Education and Training Experience, Australia, 2005*, Cat. no. 6278.0.
- 2013, *Work-Related Training and Adult Learning, Australia, Apr 2013*, Cat. no 4234.0.
- 2017, *Work-Related Training and Adult Learning, Australia, 2016-17 financial year*, Cat. no 4234.0.
- 2018, *Population Projections, Australia, 2017 (base) - 2066*, Cat no. 3222.0.
- 2021, *Experimental school education multifactor productivity estimates*, Cat. no. 8104.0.
- 2022a, *Australian Census of Population and Housing 2021*.
- 2022b, *Estimates of Industry Multifactor Productivity, 2021-22 financial year*, Cat. no. 5260.0.55.001.
- 2022c, *Government Finance Statistics, Australia, 2020-21*, Cat. no. 5512.
- 2022d, *Labour Force, Australia, Detailed, November 2022*, Cat. no. 6291.0.55.001.
- 2022e, *National, state and territory population, June 2022*, Cat. no. 3222.0.
- 2022f, *Schools, Australia 2021*, Cat. no. 4221.0.
- 2022g, *Work-Related Training and Adult Learning, Australia, 2020-21 financial year*, Cat. no 4234.0.
- ACARA (Australian Curriculum, Assessment and Reporting Authority) 2022a, *National Report on Schooling in Australia 2020*.
- 2022b, *Primary curriculum*, <https://www.australiancurriculum.edu.au/resources/primary-curriculum/> (accessed 27 April 2022).
- 2022c, *Review of the Australian Curriculum*.
- 2022d, *Submission to the Review of the National School Reform Agreement*.
- ACIL Allen Consulting 2015, *Evaluation of Skills for All: Review of the First Phase of Implementation, Final Report to the South Australian Department of State Development*.
- 2017, *Evaluation of the Higher Education Participation Partnership Program*, Melbourne.
- ACTO, CO & OSO (ACT Ombudsman, Commonwealth Ombudsman and Overseas Student Ombudsman) 2016, *Complaint Handling at Universities: Best Practice Guidelines*, March, Canberra.
- AERA, APA & NCME (American Educational Research Association, American Psychological Association, National Council on Measurement, and National Council on Measurement) 2014, *Standards for Educational and Psychological Testing*, Washington D.C.
- AERO 2021, *Evidence-based teaching strategies – how often are Australian teachers using them?*, <https://www.edresearch.edu.au/articles/evidence-based-teaching-strategies-how-often-are-australian-teachers-using-them> (accessed 25 July 2022).
- 2022, *Submission to the Productivity Commission Review into the National School Reform Agreement*.
- AEWG (Accelerated Education Working Group) 2021, *Catch-up Programmes: 10 Principles for Helping Learners Catch Up and Return to Learning*.
- Ai Group 2022, 'Skills Standards and VET qualifications', webinar, 8 November.
- AIHW (Australian Institute of Health and Welfare) 2022, *Home Ownership and Housing Tenure*, <https://www.aihw.gov.au/reports/australias-welfare/home-ownership-and-housing-tenure> (accessed 15 September 2022).
- AITSL (Australian Institute of Teaching and School Leadership) 2018, *Australian Professional Standards for Teachers*.
- 2020, *Shifting the balance: Increasing the focus on teaching and learning by reducing the burden of compliance and administration*.
- 2021, *Australian Teacher Workforce Data: National Teacher Workforce Characteristics Report*.
- 2022, *Submission to the Productivity Commission Review into the National Schools Reform Agreement*.
- Alpert, W., Couch, K. and Harmon, O. 2016, 'A randomized assessment of online learning', *American Economic Review*, vol. 106, no. 5, pp. 378–382.
- AlphaBeta 2018, *Future Skills*, Prepared for Google Australia.
- Ambinder, E. 2005, 'A history of the shift towards full computerization of medicine', *Journal of Oncology Practice*, no. 2, pp. 54–56.
- ArtsUnimelb 2018, *What Does Teaching Talk Do For Your Research?*, *Curriculum Design Lab*, 4 June.
- ASQA (Australian Skills Quality Authority) 2021, *ASQA's Strategic Review of Online Learning*, Insight paper No.3.
- ATO (Australian Taxation Office) 2022a, *Removing the self-education expenses threshold*, Australian Taxation Office, <https://www.ato.gov.au/General/New-legislation/In-detail/Other-topics/Removing-the-self-education-expenses-threshold/> (accessed 20 December 2022).
- 2022b, *Small Business Technology Investment Boost and Small Business Skills and Training Boost*, <https://www.ato.gov.au/General/New-legislation/In-detail/Direct-taxes/Income-tax-for-businesses/Small-Business-Technology-Investment-Boost-and-Small-Business-Skills-and-Training-Boost/> (accessed 9 September 2022).
- Aungles, P., Hodgson, G. and Parbery, S. 2021, *Graduate incomes: Insights from administrative data*, Department of Education, Skills and Employment.
- Baker, S., Hyejeong, K., Marangell, S., Baik, C., Arkoudis, S., Croucher, G. and Laffernis, F. 2022, *Engaging 'Diverse' Students: An Audit of Strategies to Foster Intercultural Engagement in Australian Public Universities*, June, Melbourne Centre for the Study of Higher Education, Melbourne.
- Barteit, S., Lanfermann, L., Bärnighausen, T., Neuhann, F. and Beiersmann, C. 2021, 'Augmented, mixed, and virtual reality-based head-mounted devices for medical education: systematic review', *JMIR Serious Games*, vol. 9, no. 3, p. e29080.
- Becker, G.S. 1962, 'Investment in human capital: a theoretical analysis', *Journal of Political Economy*, vol. 70, no. 5, pp. 9–49.

- Bennett, A., Naylor, R., Mellor, K., Brett, M., Gore, J., Harvey, A., James, R., Munn, B., Smith, M. and Whitty, G. 2015, *The Critical Interventions Framework Part 2: Equity Initiatives in Australian Higher Education: A Review of Evidence of Impact*, University of Newcastle.
- Bentsen, K.H., Munch, J.R. and Schaur, G. 2019, 'Education spillovers within the workplace', *Economics Letters*, vol. 175, pp. 57–59.
- van den Berge, W., Jongen, E. and van der Wiel, K. 2022, 'The effects of a tax deduction for lifelong learning expenditures', *International Tax and Public Finance*.
- Berry, M. and Guest, R. 2018, 'Excellence for all: inclusive teaching with a passion – a teaching excellence recognition scheme', *Global Perspectives on Teaching Excellence*, Routledge, pp. 143–155.
- Bettinger, E., Gurantz, O., Kawano, L., Sacerdote, B. and Stevens, M. 2019, 'The Long-Run Impacts of Financial Aid: Evidence from California's Cal Grant', *American Economic Journal: Economic Policy*, vol. 11, no. 1, pp. 64–94.
- Bhuller, M., Mogstad, M. and Salvanes, K.G. 2017, 'Life-cycle earnings, education premiums, and internal rates of return', *Journal of Labor Economics*, vol. 35, no. 4, pp. 993–1030.
- Black, S., Denning, J., Dettling, L., Goodman, S. and Turner, L. 2020, *Taking It to the Limit: Effects of Increased Student Loan Availability on Attainment, Earnings, and Financial Well-Being*, Working Paper, National Bureau of Economic Research.
- Boeskens, L. and Nusche, D. 2021, *Not enough hours in the day: policies that shape teachers' use of time*, OECD Education Working paper 245.
- Boring, A. and Ottoboni, K. 2016, 'Student evaluations of teaching (mostly) do not measure teaching effectiveness', *ScienceOpen Research*.
- Bowen, W., Chingos, M., Lack, K. and Nygen, T. 2013, 'Interactive learning online at public universities: evidence from a six-campus randomized trial', *Journal of Policy Analysis and Management*, vol. 33, no. 1, pp. 94–111.
- Bradley, D., Noonan, P., Nugent, H. and Scales, B. 2008, *Review of Australian Higher Education*, Department of Education, Employment and Workplace Relations (DEEWR), Canberra.
- Braithwaite, V. 2018, *All eyes on quality: Review of the National Vocational Education and Training Regulator Act 2011 Report*, Report to the Assistant Minister for Vocational Education and Skills, Australian Government, Canberra.
- Brown, J. 2017, *In Their Words: Student Choice in Training Markets - Victorian Examples*, Research Report, National Centre for Vocational Education Research, Adelaide.
- Canty, D., Barth, J., Yang, Y., Peters, N., Palmer, A., Royse, A. and Royse, C. 2019, 'Comparison of learning outcomes for teaching focused cardiac ultrasound to physicians: a supervised human model course versus an eLearning guided self-directed simulator course', *Journal of Critical Care*, vol. 49, pp. 38–44.
- Centre for Population Projections 2021, *Latest Projections*, <https://population.gov.au/data-and-forecasts/projections#national> (accessed 8 August 2022).
- Chalmers, D. and Gardiner, D. 2015, 'An evaluation framework for identifying the effectiveness and impact of academic teacher development programmes', *Studies in Educational Evaluation*, vol. 46, pp. 81–91.
- Chapman, B. and Khemka, G. 2022, 'Understanding recent HECS–HELP price misunderstandings', *Journal of Public Administration*, vol. 81, pp. 53–69.
- Chen, F., Leng, Y., Ge, J., Wang, D., Li, C., Chen, B. and Sun, Z. 2020, 'Effectiveness of virtual reality in nursing education: Meta-analysis', *Journal of Medical Internet Research*, vol. 22, no. 9, p. e18290.
- Cherastiditham, I. and Norton, A. 2018, *University Attrition: What Helps and What Hinders University Completion?*, Grattan Institute.
- , Sonnemann, J. and Norton, A. 2013, *The teaching-research nexus in higher education*, October, Grattan Institute.
- Christian, K., Johnstone, C., Larkins, J., Wright, W. and Doran, M.R. 2021, 'A survey of early-career researchers in Australia', Rodgers, P., Deathridge, J., Lijek, R.S., Rolf, H. and Hussain, T. (eds), eLife Sciences Publications, Ltd, eLife, vol. 10, p. e60613.
- Chu, Y.-W.L. and Cuffe, H.E. 2021, 'Do Academically Struggling Students Benefit From Continued Student Loan Access? Evidence From University and Beyond', *The Review of Economics and Statistics*, pp. 1–45.
- Coaldrake, P. 2019, *What's in a Name? Review of the Higher Education Provider Category Standards - Final Report*, Department of Education, Canberra.
- and Stedman, L. 2016, *Raising the Stakes: Gambling with the Future of Universities*, 2nd edn, University of Queensland Press.
- Coelli, M., Tabasso, D. and Zakirova, R. 2012, *Studying beyond age 25: Who does it and what do they gain?*, National Centre for Vocational Education Research, Adelaide.
- Cohen, C. 2016, *Australian Universities' Potential Liability for Courses That Fail to Deliver*, December, Colin Biggers & Paisley Lawyers.
- Cole, S., Paulson, A. and Shastry, G.K. 2014, 'Smart money? The effect of education on financial outcomes', *Review of Financial Studies*, vol. 27, no. 7, pp. 2022–2051.
- Committee on Higher Education Funding 1988, *Report of the Committee on Higher Education Funding [Wran report]*, Department of Employment, Education and Training.
- Commonwealth of Australia 2022a, *Budget 2022-23: Budget Measures Budget Paper No. 2*, March, Canberra.
- 2022b, *Budget October 2022-23: Budget Strategy and Outlook Budget Paper No. 1*, October, Canberra.
- Commonwealth Ombudsman 2020, *Quarterly Update 14: 1 October–31 December 2020*.
- Competition and Markets Authority 2015, *UK higher education providers - advice on consumer protection law: Helping you comply with your obligations*, CMA33.
- Cook, R., Butcher, I. and Raeside, R. 2007, 'Recounting the scores: an analysis of the QAA subject review grades 1995–2001', *Quality in Higher Education*, vol. 12, no. 2, pp. 135–144.
- CooperGibson Research 2021, *Education Technology (EdTech) Survey 2020-21*, Commissioned by the Department for Education (UK).
- Cornell-Farrow, S. 2019, *Improving measures of school education output and productivity in Queensland*, Staff Research Paper, Queensland Productivity Commission.
- Corney & LindLawyers 2020, *Student's Poor Performance - Who is to blame for it?*, Herston, Queensland, <https://www.corneyandlind.com.au/education-law/could-a-school-be-liable-in-negligence-for-a-students-poor-performance/> (accessed 5 December 2022).
- Corones, S. 2012, 'Consumer guarantees and the supply of educational services by higher education providers', *UNSW Law Journal*, vol. 35, no. 1, pp. 1–30.

- Criscuolo, C., Gal, P., Leidecker, T. and Nicoletti, G. 2021, *The human side of productivity: Uncovering the role of skills and diversity for firm productivity*, OECD Productivity Working Papers, No. 29, OECD Publishing, Paris.
- Cunninghame, I. and Pitman, T. 2020, 'Framing the benefits of higher education participation from the perspective of non-completers', *Higher Education Research & Development*, vol. 39, no. 5, pp. 926–939.
- CYDA (Children and Young People with Disability Australia) 2022, *What are the benefits of inclusive education?*, Fact Sheet, <https://www.cyda.org.au/resources/details/60/what-are-the-benefits-of-inclusive-education> (accessed 30 October 2022).
- Dawkins, P.J. and Dixon, J.M. 2015, *Alternative Approaches to Fee Flexibility: Towards a Third Way in Higher Education Reform in Australia*, Centre of Policy Studies, Victoria University, Melbourne, Victoria.
- Deloitte Access Economics 2016, *Estimating the public and private benefits of higher education*, Department of Education and Training.
- 2020, *The importance of universities to Australia's prosperity*.
- 2022, *Transparency in Higher Education expenditure, June 2022*, Department of Education.
- Deming, D.J. 2022, 'Four facts about human capital', *Journal of Economic Perspectives*, vol. 36, no. 3, pp. 75–102.
- Denning, J.T., Marx, B.M. and Turner, L.J. 2019, 'ProPelled: The Effects of Grants on Graduation, Earnings, and Welfare', *American Economic Journal: Applied Economics*, vol. 11, no. 3, pp. 193–224.
- Department of Education 2022a, *National Teacher Workforce Action Plan*.
- 2022b, *Short courses*, Department of Education, <https://www.education.gov.au/job-ready/short-courses> (accessed 4 January 2023).
- 2022c, *2022 Allocation of units of study to funding clusters*, Department of Education, <https://www.education.gov.au/higher-education-loan-program/resources/2022-allocation-units-study-funding-clusters> (accessed 9 December 2022).
- DESE (Department of Education Skills and Employment) 2019, *Benefits of educational attainment*, <https://www.dese.gov.au/integrated-data-research/benefits-educational-attainment> (accessed 9 August 2022).
- 2020, *Job-ready Graduates Discussion Paper*.
- 2021a, *2020 Higher Education Providers Finance Tables*.
- 2021b, *HELP Debt and Repayments Report*, <https://app.powerbi.com/view?r=eyJrIjoiMjUxYjg5ZjgtODM5Ny00MjFjLTg2NTEtOWIzZjRkZjFmYmU2liwidCI6ImRkMGNmZD E1LTQ1NTgtNGIxMi04YmFkLWVhMjY5ODRmYzQxNyJ9> (accessed 26 August 2022).
- 2021c, *Technical Note for Job-ready Graduates Package*.
- 2021d, *The National Schools Reform Agreement - Fact sheet*, <https://www.dese.gov.au/quality-schools-package/fact-sheets/national-school-reform-agreement> (accessed 24 June 2022).
- 2022a, *Completion Rates - Cohort Analyses*, <https://www.dese.gov.au/higher-education-statistics/student-data/completion-rates-cohort-analyses> (accessed 28 July 2022).
- 2022b, *Higher education commencing student enrolment tables 2020*, 14 February.
- 2022c, *Improving higher education for students*, <https://www.dese.gov.au/job-ready/improving-higher-education-students> (accessed 17 August 2022).
- 2022d, *Selected Higher Education Statistics – 2020 Student data*, <https://www.dese.gov.au/higher-education-statistics/student-data/selected-higher-education-statistics-2020-student-data-0> (accessed 6 April 2022).
- 2022e, *Selected Higher Education Statistics - Staff 2020: Appendix 1 – Actual Staff Full-time equivalence*, Australian Government.
- 2022f, *Student Enrolment Pivot Table*.
- and PwC (Department of Education, Skills and Employment and Price Waterhouse Coopers) 2021, *National Microcredentials Framework*, November.
- Despujol, I., Castañeda, L. and Turró, C. 2022, 'MOOCs as a massive learning resource for a Higher Education Community. The Universitat Politècnica de València experience using the EdX remote access program', *Education and Information Technologies*, vol. 27, no. 9, pp. 12999–13020.
- Deunk, M.I., Smale-Jacobse, A.E., de Boer, H., Doolaard, S. and Bosker, R.J. 2018, 'Effective differentiation practices: A systematic review and meta-analysis of studies on the cognitive effects of differentiation practices in primary education', *Educational Research Review*, vol. 24, pp. 31–54.
- DEWR (Department of Employment and Workplace Relations) 2022a, *Industry Engagement Reforms*, <https://www.dewr.gov.au/skills-reform/skills-reform-overview/industry-engagement-reforms> (accessed 19 December 2022).
- 2022b, *Qualification Reform Consultation*, Qualification Reform Consultation, <https://www.dewr.gov.au/skills-reform/skills-reform-overview/qualifications-reforms/qualification-model-consultation> (accessed 10 January 2023).
- 2022c, *Skills Checkpoint for Older Workers Program*, <https://www.dewr.gov.au/skills-checkpoint-older-workers-program> (accessed 9 September 2022).
- 2022d, *Skills Reform*, <https://www.dewr.gov.au/skills-reform> (accessed 19 December 2022).
- 2022e, *The Mid-Career Checkpoint program*, Department of Employment and Workplace Relations.
- 2022f, *Workforce Australia employment services*, Department of Employment and Workplace Relations, <https://www.dewr.gov.au/workforce-australia-employment-services> (accessed 20 January 2023).
- 2023, *Employability Skills Training*, Department of Employment and Workplace Relations, <https://www.dewr.gov.au/employability-skills-training> (accessed 20 January 2023).
- DfE and UCAS (Department for Education (UK) and The Universities and Colleges Admissions Service) 2021, *Research to Support the Independent TEF Review: Surveys of HE Applicants*.
- Dodd, R.H., Dadaczynski, K., Okan, O., McCaffery, K.J. and Pickles, K. 2021, 'Psychological wellbeing and academic experience of university students in Australia during COVID-19', *International Journal of Environmental Research and Public Health*, vol. 18, no. 3, p. 866.
- Dodd, T. 2020, *Tehan's job-ready package unfair to university students*, 30 September, <https://www.theaustralian.com.au/higher-education/tehan-s-job-ready-package-unfair-to-university-students/news-story/5c00b7b5c41ecafd49db77928e4c0da4> (accessed 27 January 2023).

- Dostie, B. 2010, *Estimating the Returns to Firm-Sponsored On-the-Job and Classroom Training*, CIRANO - Scientific Publications, 2010s–44.
- Duffy, C. and Stewart, J. 2022, 'Investigation reveals tracking by EdTech of millions of Australian school students during COVID lockdowns', *ABC News*, 25 May.
- Edtech Impact 2022, *Formative Assessment Tools And Software Buyers' Guide*, <https://edtechimpact.com/news/formative-assessment-tools-and-software-buyers-guide> (accessed 15 June 2022).
- Education Council 2020, *Looking to the future: report of the review of senior secondary pathways into work, further education and training*, Department of Education, Skills and Employment.
- Edwards, D. and McMillan, J. 2015, *Completing University in a Growing Sector: Is Equity an Issue?*, Australian Council for Educational Research.
- Epple, D., Romano, R. and Zimmer, R. 2015, *Charter Schools: A Survey of Research on Their Characteristics and Effectiveness*, Working Paper 21256, National Bureau of Economic Research.
- Ernst, E., Merola, R. and Samaan, D. 2019, 'Economics of artificial intelligence: Implications for the future of work', *IZA Journal of Labour Policy*, vol. 9, no. 1, pp. 1–35.
- eSafety Commissioner 2022, *Toolkit for Schools*, <https://www.esafety.gov.au/educators/toolkit-schools> (accessed 8 August 2022).
- Esarey, J. and Valdes, N. 2020, 'Unbiased, reliable, and valid student evaluations can still be unfair', *Routledge, Assessment & Evaluation in Higher Education*, vol. 45, no. 8, pp. 1106–1120.
- Evidence for Learning 2019a, *Making best use of teaching assistants*, Guidance Report.
- 2019b, *Putting evidence to work: a school's guide to implementation*, Guidance Report.
- Falch, T., Iversen, J.M.V., Nyhus, O.H. and Strøm, B. 2022, 'Quality measures in higher education: Norwegian evidence', *Economics of Education Review*, vol. 87.
- Fan, E., Meng, X., Wei, Z. and Guochang, Z. 2010, *Rates of Return to University Education: The Regression Discontinuity Design*, IZA.
- Ferguson, H. 2020a, 'Higher Education Support Amendment (Job-ready Graduates and Supporting Regional and Remote Students) Bill 2020', *Parliamentary Library Bills Digest*, No. 12 2020-21, pp. 1–53.
- 2020b, 'National Skills Commissioner Bill 2020', *Parliamentary Library Bills Digest*, No. 100, 2019-20, pp. 1–15.
- 2021a, *A guide to Australian Government funding for higher education learning and teaching*, Research Paper Series, 2020-21, Parliamentary Library.
- 2021b, *Updated Higher Education Loan Program (HELP) debt statistics — 2020-21*, FlagPost, Parliamentary Library.
- Figlio, D., Rush, M. and Yin, L. 2013, 'Is it live or is it internet? Experimental estimates of the effects of online instruction on student learning', *Journal of Labor Economics*, vol. 31, no. 4, pp. 763–784.
- Fitzgerald, R. 2022, 'Manyallaluk School's quest for elusive pokipain and rare finch receives Landcare nomination', *ABC News*, 17 August.
- Floyd, E., Tomar, S. and Lee, D. 2022, *Making the Grade (But Not Disclosing It): How Withholding Grades Affects Student Behavior and Employment*, SMU Cox School of Business Research Paper, No. 22-13.
- Fogarty, W. 2012, 'Country as classroom', *People on country: Vital landscapes, Indigenous futures*, Federation Press.
- and Schwab, R. 2013, *Indigenous education: Experiential learning and learning through country*, Centre for Aboriginal Economic Policy Research (CAEPR), Canberra.
- de Fontenay, C., Lampe, B., Nugent, J. and Jomini, P. 2020, *Climbing the Jobs Ladder Slower: Young People in a Weak Labour Market*, Productivity Commission Staff Working Paper, Canberra.
- Forbes, M., Barker, A. and Turner, S. 2010, *The effects of education and health on wages and productivity*, Productivity Commission Staff Working Paper, Productivity Commission, Melbourne, Vic.
- Fournier, J. and Johansson, A. 2016, *The Effect of the Size and the Mix of Public Spending on Growth and Inequality*, OECD Economics Department Working Papers, 1344.
- Frey, B. and Gallus, J. 2017a, *Honours Versus Money*, Oxford University Press, Oxford.
- and — 2017b, 'Towards an Economics of Awards', *Journal of Economic Surveys*, vol. 31, no. 1, pp. 190–200.
- Gill, B.P. 2016, *The Effect of Charter Schools on Students in Traditional Public Schools: A Review of the Evidence*, Education Next.
- Goldacre, L. 2013, 'The contract for the supply of educational services and unfair contract terms: advancing students' rights as consumers', *University of Western Australia Law Review*, vol. 37, no. 1, pp. 176–215.
- Gonski, D., Arcus, T., Boston, K., Gould, V., Johnson, W., O'Brien, L., Perry, L.-A. and Roberts, M. 2018, *Through Growth to Achievement: The Report of The Review to Achieve Educational Excellence in Australian Schools*, Commonwealth of Australia.
- and Shergold, P. 2021, *In the same sentence: bringing higher and vocational education together*.
- Goss, P. and Sonnemann, J. 2020, *Top teachers sharing expertise to improve teaching*, Grattan Institute.
- Grattan Institute 2022, *Submission to the Productivity Commission Review of the National Schools Reform Agreement*.
- Griffin, T. and Mihelic, M. 2019, *Online Delivery of Vet Qualifications: Current Use and Outcomes*, NCVER.
- Hai, R. and Heckman, J.J. 2022, *The Causal Effects of Youth Cigarette Addiction and Education*, Working Paper, National Bureau of Economic Research.
- Hallberg, K., Eaglin, C., Hiram, R. and Ruizesparza, A. 2022, *Supporting Students in Achieving their Postsecondary Goals: A Quasi-Experimental Program Evaluation of OneGoal*, University of Chicago Inclusive Economy Lab.
- Halsey, J. 2018, *Independent Review into Regional, Rural and Remote Education*, Final Report, Department of Education, Skills and Employment.
- Hampf, F. 2020, *Education, skills & labor-market success: microeconomic analyses using large-scale skills assessments*, ifo Beiträge zur Wirtschaftsforschung, 89 (2020), Ifo-Institut, München.
- Hanushek, E.A. 2011, 'The economic value of higher teacher quality', *Economics of Education Review*, vol. 30, pp. 466–479.
- Harvey, A. and Szalkowicz, G. 2016, 'Developing multiple exit pathways within undergraduate courses', *International Studies in Widening Participation*, vol. 3, pp. 52–67.
- Harvey, Cakitaki and Brett 2018, *Principles for equity in higher education performance funding*, NCSEHE,

- <https://www.ncsehe.edu.au/publications/principles-for-equity-in-higher-education-performance-funding/> (accessed 20 July 2022).
- HATI International 2017, *Technology in healthcare - a long and continuing history*, <https://hatiintl.com/blog/technology-in-healthcare-a-long-and-continuing-history> (accessed 7 August 2022).
- Hattie, J. 2003, 'Teachers Make a Difference, What is the research evidence?', presented at Paper presented at the Building Teacher Quality: What does the research tell us ACER Research Conference, Melbourne.
- Hatton, A. and Drake, R. 2019, *An analysis of the performance of sponsored academies*, Department of Education (UK).
- Havari, E. and Savegnago, M. 2014, *The Causal Effect of Parents' Schooling on Children's Schooling in Europe. A New IV Approach.*, CEIS Working Paper, No. 315.
- Havranek, T., Irsova, Z. and Zeynalova, O. 2018, 'Tuition fees and university enrolment: a meta-regression analysis', *Oxford Bulletin of Economics and Statistics*, vol. 80, no. 6, pp. 1145–1184.
- Heckman, J.J. and Kautz, T. 2012, 'Hard evidence on soft skills', *Labour Economics*, vol. 19, no. 4, pp. 451–464.
- Hemelt, S.W., Stange, K.M., Furquim, F., Simon, A. and Sawyer, J.E. 2018, *Why is Math Cheaper than English? Understanding Cost Differences in Higher Education*, Working Paper, National Bureau of Economic Research, WP 25314.
- HESP (Higher Education Standards Panel) 2017, *Improving Retention, Completion and Success in Higher Education*, Final Report.
- Hessler, M., Pöpping, D.M., Hollstein, H., Ohlenburg, H., Arnemann, P.H., Massoth, C., Seidel, L.M., Zarbock, A. and Wenk, M. 2018, 'Availability of cookies during an academic course session affects evaluation of teaching', *Medical Education*, vol. 52, no. 10, pp. 1064–1072.
- Hetherington, D. and Rust, J. 2013, *Training Days: Models of Vocational Training Provision: Lessons from the Victorian Experience*, Per Capita.
- Higher Education and Research Group 2020, *Cost Allocation and Productivity in Australian Higher Education: An Evidence-based Approach.*, Higher Education Support Amendment (Job-Ready Graduates and Supporting Regional and Remote Students) Bill 2020 Submission 80.
- Hjalmarsson, R., Holmlund, H. and Lindquist, M.J. 2014, 'The Effect of Education on Criminal Convictions and Incarceration: Causal Evidence from Micro-data', *Economic Journal*, vol. 125, no. 587, pp. 1290–1326.
- Hobbs, L. and Porsch, R. 2021, 'Teaching out-of-field: challenges for teacher education', *European Journal of Teaching Education*, vol. 44, no. 5, pp. 601–610.
- HoC (UK House of Commons Petition Committee) 2020, *The impact of Covid-19 on university students: Second Report of Session 2019–21*, 7 July.
- Hou, Y.-W. and Jacob, W.J. 2017, 'What contributes more to the ranking of higher education institutions? A comparison of three world university rankings', *International Education Journal: Comparative Perspectives*, vol. 16, no. 4, pp. 29–46.
- Houghton, K.A., Bagranoff, N. and Jubb, C. 2021, 'The funding of higher education: an empirical examination of the cost of education in business schools', *Abacus*, vol. 57, no. 4, pp. 780–809.
- Huang, Z., Phillips, G.M., Yang, J. and Zhang, Y. 2020, *Education and Innovation: The Long Shadow of the Cultural Revolution*, Working Paper, National Bureau of Economic Research.
- Hum, G., Amundsen, C. and Emmiöglu, E. 2015, 'Evaluating a teaching development grants program: Our framework, process, initial findings, and reflections', *Studies in Educational Evaluation*, vol. 46, pp. 29–38.
- Hunter, J., Haywood, A. and Parkinson, N. 2022, *Ending the Lesson Lottery: How to Improve Curriculum Planning in Schools*, Grattan Institute.
- Hunter, J., Sonnemann, J. and Joiner, R. 2022, *Making Time for Great Teaching: How Better Government Policy Can Help*, Grattan Institute.
- Huntington-Klein, N. 2021, 'Human capital versus signaling is empirically unresolvable', *Empirical Economics*, vol. 60, no. 5, pp. 2499–2531.
- Hutchings, M. and Francis, B. 2018, *Chain effects 2018: the impact of academy chains on low-income pupils*.
- ImpactEd 2022, *Oak National Academy 2021-22 Evaluation Report*, London.
- Infrastructure Australia 2021, *Guide to economic appraisal: Technical guide of the Assessment Framework*, July.
- Ingvarson, L. and Rowe, K. 2008, 'Conceptualising and Evaluating Teacher Quality: Substantive and Methodological Issues', *Australian Journal of Education*, vol. 52, no. 1, pp. 5–35.
- Jackson, J., Tangalakis, K. and Solomonides, I. 2022, *Equity Through Complexity: Inside the 'Black Box' of the Block Model*, National Centre for Student Equity in Higher Education.
- Jensen, B., Sonnemann, J., Roberts-Hull, K. and Hunter, A. 2016, *Beyond PD: Teacher Professional Learning in High-Performing Systems*, National Center on Education and the Economy, Washington, D.C.
- Jervis-Bardy, D. 2020, 'Revealed: Budget Blowout Behind VET Cuts', *The Canberra Times*, 27 January.
- Jha, N. and Polidano, C. 2016, *Vocational Education and Training: A Pathway to the Straight and Narrow*, Melbourne Institute Working Paper, No. 21/16.
- Jobs and Skills Australia 2022, *IVI Detailed Vacancy Report October 2022*, <https://labourmarketinsights.gov.au/our-research/internet-vacancy-index/> (accessed 5 January 2023).
- Johansen, J. 2009, *The Impact of OpenCourseWare on Paid Enrollment in Distance Learning Courses*, Thesis, Brigham Young Univeirsty.
- Johnston, A.L., Baik, C. and Chester, A. 2022, 'Peer review of teaching in Australian higher education: a systematic review', *Higher Education Research & Development*, vol. 41, no. 2, pp. 390–404.
- Joyce, S. 2019a, *Strengthening Skills: Expert Review of Australia's Vocational Education and Training System*, Department of Prime Minister and Cabinet.
- 2019b, *Vocational Education and Training Review*, <https://www.pmc.gov.au/domestic-policy/vet-review> (accessed 27 April 2022).
- Kamhöfer, D.A., Schmitz, H. and Westphal, M. 2019, 'Heterogeneity in Marginal Non-Monetary Returns to Higher Education', *Journal of the European Economic Association*, vol. 17, no. 1, pp. 205–244.
- Kämpfen, F. 2021, 'The causal effects of education on welfare participation in the US', *Education Economics*, vol. 29, no. 6, pp. 580–596.
- Kandiko Howson, C. 2022, *Is Educational Gain the 'Dark Matter' of Student Outcomes?*, 14 February, <https://wonkhe.com/blogs/is-educational-gain-the-dark-matter-of-student-outcomes/> (accessed 12 August 2022).

- Kassenboehmer, S.C., Leung, F. and Schurer, S. 2018, 'University education and non-cognitive skill development', *Oxford Economic Papers*, vol. 70, no. 2, pp. 538–562.
- Khoo, P. and Ost, B. 2018, 'The effect of graduating with honors on earnings', *Labour Economics*, vol. 55, pp. 149–162.
- Kim, L. and Ashbury, K. 2021, 'Would a longer school day help children catch up after the pandemic?', *The Conversation*.
- Kim, T. 2021, 'Estimating pecuniary and non-Pecuniary returns to college education for academically marginal students: Evidence from the college enrollment quota policy in south korea', *Economics of Education Review*, vol. 83, p. 102142.
- Kirkeboen, L.J., Leuven, E. and Mogstad, M. 2016, 'Field of Study, Earnings, and Self-Selection', *Quarterly Journal of Economics*, vol. 131, no. 3, pp. 1057–1111.
- Kivistö, J. and Kohtamaki, V. 2015, 'Impacts of performance-based funding on higher education institutions: A literature review', 1 September.
- Kong, D., Zhang, B. and Zhang, J. 2022, 'Higher education and corporate innovation', *Journal of Corporate Finance*, vol. 72, p. 102165.
- Konings, J. and Vanormelingen, S. 2015, 'The Impact of Training on Productivity and Wages: Firm-Level Evidence', *The Review of Economics and Statistics*, vol. 97, no. 2, pp. 485–497.
- KPMG 2020, *Evaluation of the VET Student Loans Program*, 16 March, Department of Employment, Skills, Small and Family Business.
- Kreitzer, R.J. and Sweet-Cushman, J. 2022, 'Evaluating student evaluations of teaching: a review of measurement and equity bias in SETs and recommendations for ethical reform', *Journal of Academic Ethics*, vol. 20, no. 1, pp. 73–84.
- Lane, R., Parrila, R., Bower, M., Bull, R., Cavanagh, M., Forbes, A., Jones, T., Leaper, D., Khosronejad, M., Pellicano, L., Powell, S., Ryan, M. and Skrebneva, I. 2019, *Learning Progressions and Online Formative Assessment National Initiative*, AITSL.
- Leigh, A. 2008, 'Returns to education in Australia', *Economic Papers*, vol. 27, no. 3, pp. 233–249.
- Li, A.Y. 2021, 'Four Decades of Performance Funding and Counting', in Perna, L.W. (ed), *Higher Education: Handbook of Theory and Research: Volume 36*, Higher Education: Handbook of Theory and Research, Springer International Publishing, Cham, pp. 485–548.
- Li, K.C. and Wong, B.T.-M. 2021, 'Features and trends of personalised learning: a review of journal publications from 2001 to 2018', Routledge, *Interactive Learning Environments*, vol. 29, no. 2, pp. 182–195.
- Linden, K. 2022, 'Improving student retention by providing targeted support to university students who do not submit an early assessment item', *Student Success*, vol. 13, no. 1, pp. 67–73.
- Loble, L. and Hawcroft, A. 2022, *Shaping AI and Edtech to Tackle Australia's Learning Divide*, University of Technology Sydney.
- Lodge, J., Mathews, K., Kulbler, M. and Johnstone, M. 2022, *Final Report: Modes of Delivery in Higher Education*, Report prepared for the Australian Government Department of Education and the Higher Education Standards Panel, Institute for Social Science Research, The University of Queensland, Indooroopilly, Queensland.
- Lomax-Smith, J., Watson, L. and Webster, B. 2011, *Higher Education Base Funding Review: Final Report*, Department of Education, Employment and Workplace Relations, Canberra.
- London Economics 2018, *The economic impact of Group of Eight universities*.
- Lynch, K., Hill, H., Gonzalez, K. and Pollard, C. 2019, 'Strengthening the research base that informs STEM instructional improvement efforts: A meta-analysis', *Educational Evaluation and Policy Analysis*, vol. 43, no. 3, pp. 260–293.
- Major, L., Francis, G. and Tsapali, M. 2021, 'The effectiveness of technology-supported personalised learning in low-and middle-income countries: a meta-analysis', *British Journal of Education Technology*, vol. 52, pp. 1935–1964.
- Manny, A. 2020, *Socio-economic status and the ATAR*, Universities Admissions Centre.
- Marks, G.N. 2018, 'Do the labour market returns to university degrees differ between high and low achieving youth? Evidence from Australia', *Journal for Labour Market Research*, vol. 52, no. 1, p. 5.
- Mason, J. and Carr, D. 2021, 'Boosting Lifelong Learning Through Digital Online Education: Australian Perspectives and Practices', presented at First Transnational Webinar on Adult and Continuing Education (TRACED 2020), Bandung, Indonesia, pp. 129–136.
- Massaro, V. 2020, 'Funding model inadequate on teaching quality and standards', *Campus Morning Mail*, 15 July.
- Masters, E. 2021, 'New curriculum revolutionising education on traditional Aboriginal lands', *ABC News*, 3 July.
- Masters, G. 2022, *Building a world class learning system*, CSE Leading Education Series, Centre for Strategic Education, Victoria.
- Mayer, D., Allard, A., Dixon, M., Doecke, B., Kline, J., Kostogriz, A., Moss, J., Rowan, L., Walker-Gibbs, B., White, S. and Hodder, P. 2015, *Studying the Effectiveness of Teacher Education - Final Report*, Deakin University, Geelong.
- McGarth-Champ, S., Stacey, M., Wilson, R. and Fitzgerald, S. 2018, *Understanding Work in Schools: The Foundation for Teaching and Learning*, Report to the NSW Teachers Federation.
- McVicar, D. and Tabasso, D. 2016, *The Impact of Disadvantage on VET Completion and Employment Gaps*, National Centre for Vocational Education Research, Adelaide.
- Means, B. and Neisler, J. 2021, 'Teaching and learning in the time of COVID: the student perspective', *Online Learning*, vol. 25, no. 1, pp. 8–27.
- Milian, R. and Rizk, J. 2018, 'Do university rankings matter? A qualitative exploration of institutional selection at three southern Ontario universities', *Journal of Further and Higher Education*, vol. 42, no. 8, pp. 1143–1155.
- Misko, J. and Circelli, M. 2022, *Adding Value to Competency-based Training*, NCVET.
- MIT (Massachusetts Institute of Technology) 2023, *MITOPENCOURSEWARE*, <https://ocw.mit.edu/about/> (accessed 2 February 2023).
- Napthine, D. 2019, *National Regional, Rural and Remote Tertiary Education Strategy*, Final Report, Department of Education, Skills and Employment.
- National Statistics (UK) 2022, *Schools, Pupils and Their Characteristics, Academic Year 2021-22*.
- Nawarddeken Academy 2020, *Nawarddeken Academy Annual Report 2020*.

- NCEE (National Center on Education and the Economy) 2018, *How Much Time Do Students Spend in School in Top-Performing School Systems and the U.S.?*
- NCSEHE (National Centre for Student Equity in Higher Education) 2017, *Higher Education Participation and Partnerships Program: Seven Years On*.
- NCVER (National Centre for Vocational Education Research) 2016, *VET Program Completion Rates: An Evaluation of the Current Method*.
- 2020, *Apprentice and Trainee Experience and Destinations 2019*.
- 2021a, *Employers' Use and Views of the VET System 2021*.
- 2021b, *VET Qualification Completion Rates 2019*.
- 2021c, *VET Student Outcomes 2021*.
- 2022a, *Government-funded qualification completion outcomes: time series of key findings 2013–2022*, National Centre for Vocational Education Research.
- 2022b, *Total VET students and courses 2021*.
- 2022c, *VOCSTATS*, <https://www.ncver.edu.au/research-and-statistics/vocstats> (accessed 17 May 2022).
- Nelson, K., Picton, C., McMillan, J., Edwards, D., Devlin, M. and Martin, K. 2017, *Understanding the Completion Patterns of Equity Students in Regional Universities*, National Centre for Student Equity in Higher Education (NCSEHE), Perth.
- NESA (NSW Education Standards Authority) 2020, *Nurturing Wonder and Igniting Passion: Designs for a new school curriculum*, NSW Education Standards Authority.
- Nilsson, A. 2010, 'Vocational education and training – an engine for economic growth and a vehicle for social inclusion?', *International Journal of Training and Development*, vol. 14, no. 4, pp. 251–272.
- Noonan, P. 2019, *Review of the Australian Qualifications Framework Final Report 2019*, Department of Education.
- Norton, A. 2012, *Graduate Winners: Assessing the public and private benefits of higher education - Grattan Institute*, Grattan Institute.
- 2017, *Is a public-private 'balance' a useful higher education funding idea?*, 27 July, <https://andrewnorton.net.au/2017-07/27/is-a-public-private-balance-a-useful-higher-education-funding-idea/> (accessed 25 August 2022).
- 2021, *The first Job-ready Graduates university applications data*, 25 October, <https://andrewnorton.net.au/2021-10/25/the-first-job-ready-graduates-university-applications-data/> (accessed 26 August 2022).
- 2022, *Submission on priority student funding policy issues for the Universities Accord – December 2022*.
- and Cherastidtham, I. 2015, *The cash nexus: how teaching funds research in Australian universities*, Grattan Institute.
- and — 2016, *Shared interest: A universal loan fee for HELP*, Grattan Institute.
- and — 2018, *Dropping Out: the Benefits and Costs of Trying University*, Grattan Institute.
- , —, and Grattan Institute 2019, *Risks and rewards: when is vocational education a good alternative to higher education*, Grattan Institute.
- and Kemp, D. 2014, *Report of the Review of the Demand Driven Funding System*, Department of Education.
- , Sonnemann, J. and Cherastidtham, I. 2013, *Taking University Teaching Seriously*, Grattan Institute.
- NSC (National Skills Commission) 2021a, *State of Australia's Skills 2021: now and into the future*.
- 2021b, *VET average price benchmarks: findings from the national VET average price benchmark database*.
- 2022a, *Employment outlook: Industry and occupation trends over the five years to November 2026*.
- 2022b, *Employment Projections*, <https://labourmarketinsights.gov.au/our-research/employment-projections/> (accessed 23 May 2022).
- NSF (National Science Foundation) 2020, *Higher Education Research and Development Survey (HERD)*, <https://www.nsf.gov/statistics/srvyherd/#rSR&rWP&tabs-1> (accessed 3 August 2022).
- NSW Department of Education 2019, *Leading Education in a Digital World*.
- 2020, *'Best in class' to support more teachers and students*, <https://education.nsw.gov.au/news/latest-news/best-in-class-to-support-more-teachers-and-students> (accessed 21 November 2022).
- 2021a, *Planning a lesson*, <https://education.nsw.gov.au/teaching-and-learning/professional-learning/teacher-quality-and-accreditation/strong-start-great-teachers/refining-practice/planning-a-lesson#Lesson0> (accessed 26 April 2022).
- 2021b, *Quality Time: Action Plan to Simplify Administrative Practices*.
- 2022, *Supplying IT Goods and Services*, education.nsw.gov.au/about-us/supplying-to-us/supplying-it-goods-and-services (accessed 16 September 2022).
- nd, *Institute of Applied Technology*.
- NSW Treasury 2017, *NSW Government Guide to Cost-Benefit Analysis*, Policy and Guidelines Paper.
- Ochre Education 2022, *Submission to the Productivity Commission Review of the National Schools Reform Agreement*.
- ODS (Office of the Dean of Students) 2021, *Annual Report of the Dean of Students: Australian National University 2020*, Australian National University, Canberra.
- OECD 2001, *Measuring Productivity: Measurement of Aggregate and Industry-Level Productivity Growth*.
- 2010, *Improving Health and Social Cohesion through Education*.
- 2012, *Education Today 2013: The OECD Perspective*.
- 2017, *Building Skills for All in Australia: Policy Insights from the Survey of Adult Skills*.
- 2018, *World Class: How to Build a 21st-Century School System*, OECD Publishing, Paris.
- 2021a, *OECD Skills Outlook 2021: Learning for Life*, OECD Skills Outlook, OECD, https://www.oecd-ilibrary.org/education/oecd-skills-outlook-2021_0ae365b4-en (accessed 18 January 2023).
- 2021b, *Education at a Glance 2021: OECD Indicators*, OECD Publishing, Paris.
- 2021c, *Pushing the Frontiers with AI, Blockchain, and Robots*, OECD Publishing, Paris.
- 2022a, *Education at a Glance 2022: OECD Indicators*, Organisation for Economic Co-operation and Development, Paris.

- 2022b, *Mending the Education Divide: Getting Strong Teachers to the Schools That Need Them Most*, OECD Publishing, Paris.
- 2022c, *Who Cares about Using Education Research in Policy and Practice*.
- 2023, *Educational attainment and labour-force status*, https://www.oecd-ilibrary.org/education/data/education-at-a-glance/educational-attainment-and-labour-force-status_889e8641-en (accessed 30 January 2022).
- Office for Students 2018a, *Learning gain*, <https://www.officeforstudents.org.uk/advice-and-guidance/teaching/learning-gain/> (accessed 27 July 2022).
- 2018b, *TRAC data - Office for Students*, Office for Students, <https://www.officeforstudents.org.uk/data-and-analysis/trac-data/> (accessed 3 August 2022).
- OIA (Office of the Independent Adjudicator) 2022, *Annual Report 2021*, United Kingdom.
- Olga Kozar 2021, *15 ways to evidence your teaching achievements at university*, TECHE, <https://teche.mq.edu.au/2021-01/evidence-of-teaching-excellence/> (accessed 7 December 2022).
- OneGoal 2021, *Fiscal Year 2021*, Annual Report.
- Oreopoulos, P., Page, M.E. and Stevens, A.H. 2006, 'The Intergenerational Effects of Compulsory Schooling', *Journal of Labor Economics*, vol. 24, no. 4, pp. 729–760.
- Ortagus, J. Kelchen, R. Rosinger, K. & Voorhees, N. 2020, 'Performance-Based Funding in American Higher Education: A Systematic Synthesis of the Intended and Unintended Consequences', *Educational Evaluation and Policy Analysis*, vol. 42, no. 4, pp. 520-550.
- Ost, B., Pan, W. and Webber, D. 2018, 'The Returns to College Persistence for Marginal Students: Regression Discontinuity Evidence from University Dismissal Policies', *Journal of Labor Economics*, vol. 36, no. 3, pp. 779–805.
- Österman, M. 2021, 'Can We Trust Education for Fostering Trust? Quasi-experimental Evidence on the Effect of Education and Tracking on Social Trust', *Social Indicators Research*, vol. 154, no. 1, pp. 211–233.
- Parker, S.C. and van Praag, C.M. 2006, 'Schooling, Capital Constraints, and Entrepreneurial Performance', *Journal of Business & Economic Statistics*, vol. 24, no. 4, pp. 416–431.
- Parks, A., King, T. and King, S. 2021, 'One foot in the door: Exploring institutional responses to no and low engagement', p. 10.
- Paul, J. and Jefferson, F. 2019, 'A comparative analysis of student performance in an online vs. face-to-face environmental science course from 2009 to 2016', *Frontiers in Computer Science*, vol. 1, Art. 7, pp. 1–9.
- Paul, L., Loudon, B., Elliott, M. and Scott, D. 2021, *Next Steps: Report of the Quality Initial Teacher Education Review*.
- PBMC Health 2018, *The important role medical imaging plays in diagnosis and treatment*, <https://www.pbmhealth.org/news-events/blog/important-role-medical-imaging-plays-diagnosis-and-treatment> (accessed 11 August 2022).
- PC (Productivity Commission) 2012, *Schools Workforce*, Research report, Canberra.
- 2016, *National Education Evidence Base*, Report no. 80, Canberra.
- 2017a, *Shifting the Dial: 5 Year Productivity Review*, Report no. 84, Canberra.
- 2017b, *Transitioning Regional Economies*, Study Report, Canberra.
- 2017c, *University Education*, Shifting the Dial: 5 year Productivity Review, Supporting Paper no. 7.
- 2018, *Competition in the Australian Financial System*, Draft Report, Canberra.
- 2019, *The Demand Driven University System: A Mixed Report Card*, Commission Research Paper, Canberra.
- 2020a, *Indigenous Evaluation Strategy*, Canberra.
- 2020b, *Mental Health*, Report no. 95, Canberra.
- 2020c, *National Agreement for Skills and Workforce Development Review*, Study Report, Canberra.
- 2020d, *Why Did Young People's Incomes Decline?*, Commission Research Paper, Canberra.
- 2021, *Things you can't drop on your feet: An overview of Australia's services sector productivity*, PC Productivity Insights, Canberra, April.
- 2022, *Closing the Gap Annual Data Compilation Report*, July.
- 2023, *The Review of the National Schools Reform Agreement - Final Report*, Final Report, Canberra.
- Pham, L.D., Nguyen, T.D. and Springer, M.G. 2021, 'Teacher Merit Pay: A Meta-Analysis', American Educational Research Association, *American Educational Research Journal*, vol. 58, no. 3, pp. 527–566.
- Pittman, C.N. and Heiselt, A.K. 2014, 'Increasing accessibility: using universal design principles to address disability impairments in the online learning environment', *Online Journal of Distance Learning Administration*, vol. 17, no. 3, pp. 1–11.
- Polidano, C. and Ryan, C. 2016, *Long-Term Outcomes from Australian Vocational Education*, Melbourne Institute Working Paper, No. 35/16.
- , van de Ven, J. and Voitchovsky, S. 2017, *The Power of Self-Interest: Effects of Education and Training Entitlements in Later-Life*.
- , — and — 2021, 'Are Broad-Based Vouchers an Effective Way to Support Life-Long Learning? Evidence from an Australian Reform', *Research in Higher Education*, vol. 62, no. 7, pp. 998–1038.
- Postareff, L., Lindblom-Ylänne, S. and Nevgi, A. 2007, 'The effect of pedagogical training on teaching in higher education', *Teaching and Teacher Education*, vol. 23, pp. 557–571.
- Prada, M.F., Rucci, G. and Urzúa, S. 2019, *Training, Soft Skills and Productivity: Evidence from a Field Experiment in Retail*, IZA Discussion Paper, No. 12447.
- Precl, N. 2022, 'Box Hill Institute to pay \$33 million to former aviation students in landmark case', Melbourne, *The Age*, 1 December.
- Probert, B. 2013, *Teaching-Focused Academic Appointments in Australian Universities: Recognition, Specialisation, or Stratification?*, Discussion Paper 1.
- Prytz, A. 2020, 'Uni students with disabilities say remote learning must improve', *The Age*, 16 August.
- PwC (PricewaterhouseCoopers) 2020, *COVID-19 reveals need for more strategic approach to technology in education*, <https://www.pwc.com.au/government/government-matters/technology-in-education-strategic-approach-COVID-19.html> (accessed 7 March 2022).

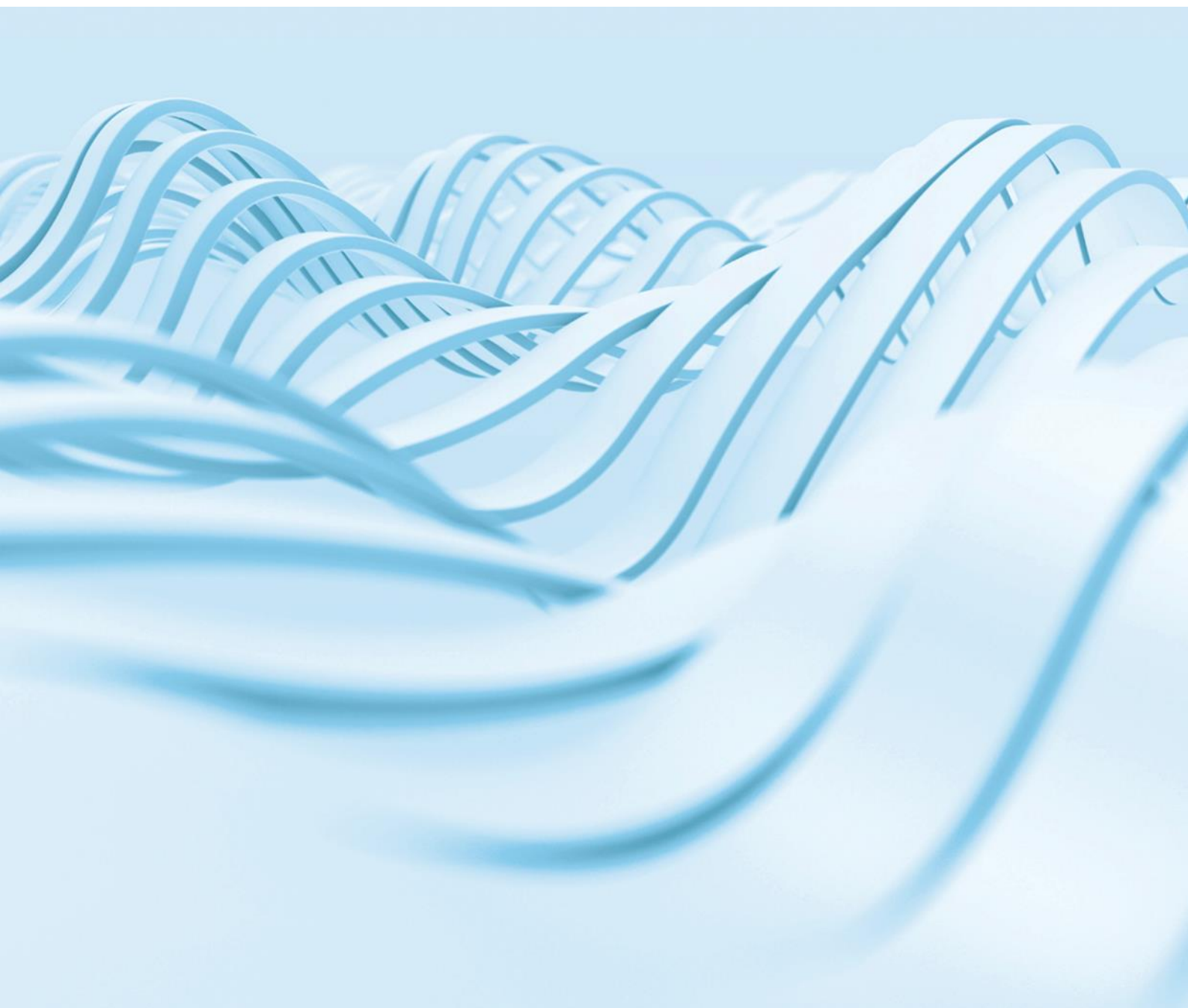
- QAA (Quality Assurance Agency for Higher Education) 2003, *Learning from Subject Review: 1993–2001*, Quality Assurance Agency for Higher Education, Gloucester.
- QAA Scotland (Quality Assurance Agency for Higher Education (Scotland)) 2017, *Enhancement-Led Institutional Review Handbook*, April.
- Quiggin, J. 2016, *Education: Excerpt from Economics in Two Lessons*, <https://johnquiggin.com/2016-12/29/education-excerpt-from-economics-in-two-lessons/> (accessed 8 October 2022).
- Riddell, W.C. and Song, X. 2017, 'The Role of Education in Technology Use and Adoption: Evidence from the Canadian Workplace and Employee Survey', *ILR Review*, vol. 70, no. 5, pp. 1219–1253.
- Ritchie, S.J. and Tucker-Drob, E.M. 2018, 'How Much Does Education Improve Intelligence? A Meta-Analysis', *Psychological Science*, vol. 29, no. 8, pp. 1358–1369.
- Robinson, M., Tomaszewski, W., Kubler, M., Johnstone, M., Clague, D., Zajac, T., Povey, J. and Salom, C. 2021, *The Student Equity in Higher Education Evaluation Framework*, Final Report, Institute for Social Science Research, The University of Queensland.
- Schueler, J. 2021, *Digital Pathways Identification Project*, November, NCVET, Adelaide.
- Schultheiss, T., Pfister, C. and Backes-Gellner, U. 2018, *Rising tide effect or crowding out — does tertiary education expansion lift the tasks of workers without tertiary degree?*, Swiss Leading House 'Economics of Education' Working Paper 154, Zurich, Switzerland.
- SCRGSP (Steering Committee for the Review of Government Service Provision) 2022, *Report on Government Services 2022 - Part B Child Care Education and Training*, Productivity Commission, Canberra.
- Shah, C., Richardson, P. and Watt, H. 2020, *Teaching 'out of field' in STEM subjects in Australia: Evidence from PISA 2015*, Discussion Paper, No. 511, Global Labor Organization.
- Siekmann, G. and Fowler, C. 2017, *Identifying Work Skills: International Approaches*, National Centre for Vocational Education Research (NCVER).
- Smith, E. 2022, 'Brief update on the TAE (Training and Education) Training Package Review', Federation University October/VET event.
- Sonnemann, J. and Goss, P. 2018, *The Commonwealth's role in improving schools*, Grattan Institute.
- Spence, M. 1973, 'Job Market Signaling', *Quarterly Journal of Economics*, vol. 87, no. 3, p. 355.
- SRC (Social Research Centre) 2021, *Graduate incomes data*, QILT, <https://www.qilt.edu.au/general/article/2021-11/04/graduate-incomes-data> (accessed 26 August 2022).
- 2022a, *2021 Employer Satisfaction Survey: Quality Indicators for Learning and Teaching*.
- 2022b, *2021 Student Experience Survey: Quality Indicators for Learning and Teaching*.
- 2022c, *2021 Student Experience Survey Report Tables: Quality Indicators for Learning and Teaching*.
- 2022d, *2022 Graduate Outcomes Survey - Longitudinal: Quality Indicators for Learning and Teaching*.
- Steiner, D., Magee, J. and Jensen, B. 2018, *What we teach matters: How quality curriculum improves student outcomes*, Learning First.
- Stephenson, B., Cakitaki, B. and Luckman, M. 2021, 'Ghost student' Failure Among Equity Cohorts: Towards *Understanding Non-Participating Enrolments*, National Centre for Student Equity in Higher Education (NCSEHE), Perth.
- Stokes, L., Hudson-Sharp, N., Dorsett, R., Rolfe, H., Anders, J., George, A., Buzzeo, J. and Munro-Lott, N. 2018, *Mathematical Reasoning: Evaluation report and executive summary*, London.
- Stone, C. 2017, *Opportunity Through Online Learning: Improving Student Access, Participation and Success in Higher Education*, National Centre for Student Equity in Higher Education (NCSEHE).
- Strahle, G. 2016, *Longer school hours could help children's education in music*, <https://musicaustralia.org.au/2016-08/longer-school-hours-could-help-childrens-education-in-music/> (accessed 23 March 2022).
- Stroebe, W. 2020, 'Student Evaluations of Teaching Encourages Poor Teaching and Contributes to Grade Inflation: A Theoretical and Empirical Analysis', *Routledge, Basic and Applied Social Psychology*, vol. 42, no. 4, pp. 276–294.
- Stroud, G. 2022, 'I can't stay. It's not enough': why are teachers leaving Australian schools?', *The Guardian*.
- Study Australia 2022, *Legal Rights and Protections*, Australian Government.
- Suhonen, T. and Karhunen, H. 2019, 'The intergenerational effects of parental higher education: Evidence from changes in university accessibility', *Journal of Public Economics*, vol. 176, pp. 195–217.
- Tasmanian Government 2020, *Adult Learning Strategy - Skills for Work and Life 2020–2023*, Department of State Growth, Tasmania.
- Teahan 2020, *Higher Education Support Amendment (Job-Ready Graduates and Supporting Regional and Remote Students) Bill 2020: Second Reading*.
- TEQSA (Tertiary Education Quality and Standards Agency) 2017a, *Characteristics of Australian Higher Education Providers and their Relation to First-Year Student Attrition*.
- 2017b, *Guidance Note: Academic Quality Assurance*.
- 2019, *Guidance Note: Nested Courses of Study*, Text, Tertiary Education Quality and Standards Agency.
- 2020, *Good Practice Note: Improving Retention and Completion of Students in Australian Higher Education*.
- 2022a, *2021 Compliance Report Case Study: Wages Underpayment*, 10 May.
- 2022b, *Compliance Report 2021*, Tertiary Education Quality and Standards Agency, Melbourne.
- 2022c, *National Register*, <https://www.teqsa.gov.au/national-register> (accessed 26 August 2022).
- 2022d, *When TEQSA can't take action*, <https://www.teqsa.gov.au/about-us/contact-us/raising-complaint-or-concern/when-teqsa-cant-take-action> (accessed 5 December 2022).
- Terada, Y. 2020, 'A Powerful Model for Understanding Good Tech Integration', *Edutopia*.
- The Smith Family 2017, *Without access to computers and the internet, disadvantaged students are getting left behind*, <https://www.thesmithfamily.com.au/stories/family-news/digital-divide> (accessed 2 August 2022).
- The University of Melbourne nd, *Fees and Payments*, <https://study.unimelb.edu.au/how-to-apply/undergraduate-study/domestic-applications/fees-and-payments> (accessed 30 January 2023).
- The University of New England nd, *2023 Undergraduate Domestic Full Fees*, <https://www.une.edu.au/study/fees-and->

- costs/tuition-fees/2022-undergraduate-domestic-full-fees (accessed 30 January 2023).
- Thomson, S. 2020, *What PISA tells us about our preparedness for remote learning*, https://research.acer.edu.au/columnists_sue_thomson/7/ (accessed 15 July 2022).
- and Hillman, K. 2019, *The Teaching and Learning International Survey 2018*, Australian Council for Educational Research.
- Toft Hansen, A., Hvidman, U. and Sievertsen, H.H. 2021, *Grades and Employer Learning*, IZA Discussion Paper No. 14200.
- Toon, D. and Jensen, B. 2017, *Teaching Our Teachers: A Better Way, Using K-12 Curriculum to Improve Teacher Preparation*, Learning First.
- Treasury 2020, *Education and training expense deductions for individuals - discussion paper*, Australian Government.
- and Department of Home Affairs 2018, *Shaping a nation: Population growth and immigration over time*.
- UNISA (University of South Australia) 2023, *Teaching Innovation Unit*, Web based - <https://i.unisa.edu.au/staff/teaching-innovation-unit/tiu/>, Adelaide.
- Universities Australia 2022, *2022 Higher Education Facts and Figures*.
- University of Delaware 2022, *About The Cost Study | Institutional Research and Effectiveness*, <https://ire.udel.edu/cost/about-us/about-the-cost-study/> (accessed 5 January 2023).
- UNSW (University of New South Wales) 2023, *Summative Peer Review of Teaching*, Web report - <https://www.teaching.unsw.edu.au/summative-peer-review>.
- Uttl, B., White, C.A. and Gonzalez, D.W. 2017, 'Meta-analysis of faculty's teaching effectiveness: Student evaluation of teaching ratings and student learning are not related', *Studies in Educational Evaluation*, vol. 54, pp. 22–42.
- Varaprasad, N. 2021, 'Vocational Education and Training in Singapore', in Symaco, L.P. and Hayden, M. (eds), *International Handbook on Education in South East Asia*, Springer Singapore, Singapore, pp. 1–25.
- Victorian Department of Education 2020, *School operations: Privacy and Information Sharing*, <https://www2.education.vic.gov.au/pal/privacy-information-sharing/guidance/privacy-impact-assessments> (accessed 3 August 2022).
- Vilppu, H., Södervik, I., Postareff, L. and Murtonen, M. 2019, 'The effect of short online pedagogical training on university teachers' interpretations of teaching-learning situations', *Instructional Science*, vol. 47, no. 6, pp. 679–709.
- Vivian, S. 2022, 'An education revolution is taking hold in remote Arnhem Land', *ABC News*, 24 June.
- Vlies, R. van der 2020, *Digital Strategies in Education Across OECD Countries: Exploring Education Policies on Digital Technologies*, OECD.
- Walach, E. 2022, *Radiology redefined: how technology is transforming medical imaging*, <https://www.radiologytoday.net/archive/WebEx0518.shtml> (accessed 11 August 2022).
- Walsh, L., Gleeson, J., Cutler, B., Rickinson, M., Cirkony and Salisbury, M. 2022, *What, why, when and how: Australian educators' use of research and evidence in schools*, Faculty of Education, Monash University.
- Wang, K. and Zhu, C. 2019, 'MOOC-based flipped learning in higher education: students' participation, experience and learning performance', *International Journal of Educational Technology in Higher Education*, vol. 16, no. 1, p. 33.
- Warburton, M. 2021, *The rhetoric and reality of Job-ready Graduates*, University of Melbourne.
- Weale, S. 2021, 'Schools minister refuses to rule out longer school days in England', *The Guardian*.
- Weldon, P. 2016, *Out-of-field Teaching in Australian Secondary Schools*, Policy Insights, Australian Council for Educational Research.
- Wellings, P., Black, R., Craven, G., Freshwater, D. and Harding, S. 2019, *Performance-Based Funding for the Commonwealth Grant Scheme*, Final Report.
- White, D. 2022, 'Eight NSW schools to trial extended operating hours', *Sydney Morning Herald*, 10 May.
- Wibrow, B., Circelli, M. and Korbel, P. 2020, *VET's Response to Industry 4.0 and the Digital Economy: What Works*, National Centre for Vocational Education Research (NCVER).
- Willis, J., Churchward, P., Bourke, T., Spooner-Lane, R., Crosswell, L., Spina, N., Saleh, A., Hazlewood, K., Cole, J., Fuller, A. and Morgan, A. 2022, *Highly Accomplished and Lead Teachers-New narratives of possibility: A white paper to promote discussion*.
- Wilson, R. 2021, *A school system tailored to individual ability rather than age sounds good, but there's no evidence it works*, The Conversation.
- Worth, J. 2016, *Analysis of Academy School Performance in 2015 (LGA Research Report)*, National Foundation for Educational Research, Slough.
- WSU (Western Sydney University) 2020, *The place of peer review in learning and teaching*, Sydney.
- Xu, D. and Xu, Y. 2019, *The Promises and Limits of Online Higher Education*, American Enterprise Institute.
- Yong, M. 2022a, 'Demand and supply effects of university funding changes: an Australian policy analysis', Honours thesis, University of Melbourne.
- Yong, M. 2022b, 'University policy: Jason Clare higher education review should keep students front of mind', *Australian Financial Review*, 21 November, <https://www.afr.com/policy/health-and-education/university-review-must-consider-fairness-and-quality-education-20221118-p5bzf6> (accessed 20 December 2022).
- York, T., Gibson, C. and Rankin, S. 2019, 'Defining and measuring academic success', *Practical Assessment, Research, and Evaluation*, vol. 20, no. 1.
- Youmans, R.J. and Jee, B.D. 2007, 'Fudging the numbers: distributing chocolate influences student evaluations of an undergraduate course', SAGE Publications Inc, *Teaching of Psychology*, vol. 34, no. 4, pp. 245–247.
- Zacharias, N., Cherednichenko, B., Ryan, J., George, K. and Gasparini, L. 2016, *Moving Beyond 'Acts of Faith': Effective Scholarships for Equity Students*, Final report submitted to the National Centre for Student Equity in Higher Education.
- Zajac, T., Tomaszewski, W., Perales, F. and Xiang, N. 2021, 'Diverging Labour-Market Trajectories of Australian Graduates from Advantaged and Disadvantaged Social Backgrounds: A Longitudinal Analysis of Population-Wide Linked Administrative Data', *Life Course Centre Working Papers*, vol. 2021–21.
- Zhou, N. and Tariq, S. 2021, 'Australian universities ramping up 'hybrid' learning means double the work for same pay, staff say', *The Guardian*.
- Zimmerman, S.D. 2014, 'The Returns to College Admission for Academically Marginal Students', The University of Chicago Press, *Journal of Labor Economics*, vol. 32, no. 4, pp. 711–754.



5-year Productivity Inquiry: Whole-of-economy modelling

Inquiry report – *volume 9*



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ISSN 1447-1337 (online)

ISSN 1447-1329 (print)

ISBN 978-1-74037-759-1 (set)

ISBN 978-1-74037-768-3 (volume 9)

An appropriate reference for this publication is:

Productivity Commission 2023, *5-Year Productivity inquiry: Whole-of-economy modelling*, Vol. 9, Inquiry Report no. 100, Canberra

Publication enquiries:

Media, Publications and Web | phone 03 9653 2244 | email publications@pc.gov.au

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The Commission’s report is divided into 9 volumes: an overview document (volume 1) that presents our policy agenda, and inquiry content volumes (volumes 2–9) that explain in greater detail the reforms that make up the policy agenda, including a modelling appendix. The full report is available from www.pc.gov.au.

Preface

The Commission used a purpose-built computable general equilibrium (CGE) model to illustrate the whole-of-economy effects of stylised representations of some proposed reforms.¹ While the simulations are stylised, the value in using the model is its insights on:

- how productivity improvements can flow through the economy's structure, and what the changes are in underlying economic variables that are driving overall movements in aggregate outputs such as GDP, gross national income, prices, wages and use of labour
- measures relating to the impact of reforms on consumer wellbeing (in monetary terms, for example, equivalent variation) and inequality (for example, the Gini coefficient)
- the differential impacts of reforms across various groups in the economy, at both the individual level (by age, education and gender groups) and the business level (by industry).

However, there are questions that the model is not well placed to answer. CGE models trace the impacts of particular shocks over the short or long run but have limited ability to capture the broader aspects of a shock that are not explicitly defined in the model, such as uncertain spillover effects. If all or many of the inquiry's recommendations were implemented, the capacity of the economy to innovate and harness new opportunities would improve, further lifting long-run growth. These broader impacts can be illustrated using other methods, such as the simple growth accounting framework that demonstrates the power of exponential productivity growth on economic growth and living standards outlined in this inquiry's companion volume *Keys to Growth*.

This volume first covers the details of the CGE model structure and its limitations (chapter 1), data sources and parameters (chapter 2), and an outline of the simulations run for the Productivity Inquiry (chapter 3). The key results from each simulation are presented in the appendices of the relevant companion volumes of this inquiry. A summary of sensitivity testing results is presented in chapter 4, and simple representations of the model equations in chapter 5.

¹ Consultations, including a workshop in November 2022, were held to receive feedback on the development of the model and simulation results. The model and results contained in a draft version of this volume were also reviewed by LY Cao, with the review report attached at the end of this volume. The feedback received through these methods was greatly appreciated and the Commission thanks participants for their time and engagement.

1. Model structure

The CGE model for the Productivity Inquiry is a static model of the Australian economy with multiple industries in the production sector and different individual groups within the household sector, which reflect different combinations of age groups, sexes and education levels. The model structure draws on some elements from the PCNational model (used for example in PC 2022, pp. 42–45) and the illustrative CGE model used by Hosoe, Gasawa and Hashimoto (2010), but contains greater heterogeneity.

The model's industries use labour and capital in their production process, where different types of labour are provided by the different individual groups in the household sector. The government comprises another sector of the economy, as does investment. The Australian economy interacts with the rest of the world through the flow of exports and imports, capital income and investment. Figure 1.1 shows a simple representation of the model structure, including the interlinkages between parts of the economy. The number of industries, and types of labour and individual groups in this figure are illustrative only.

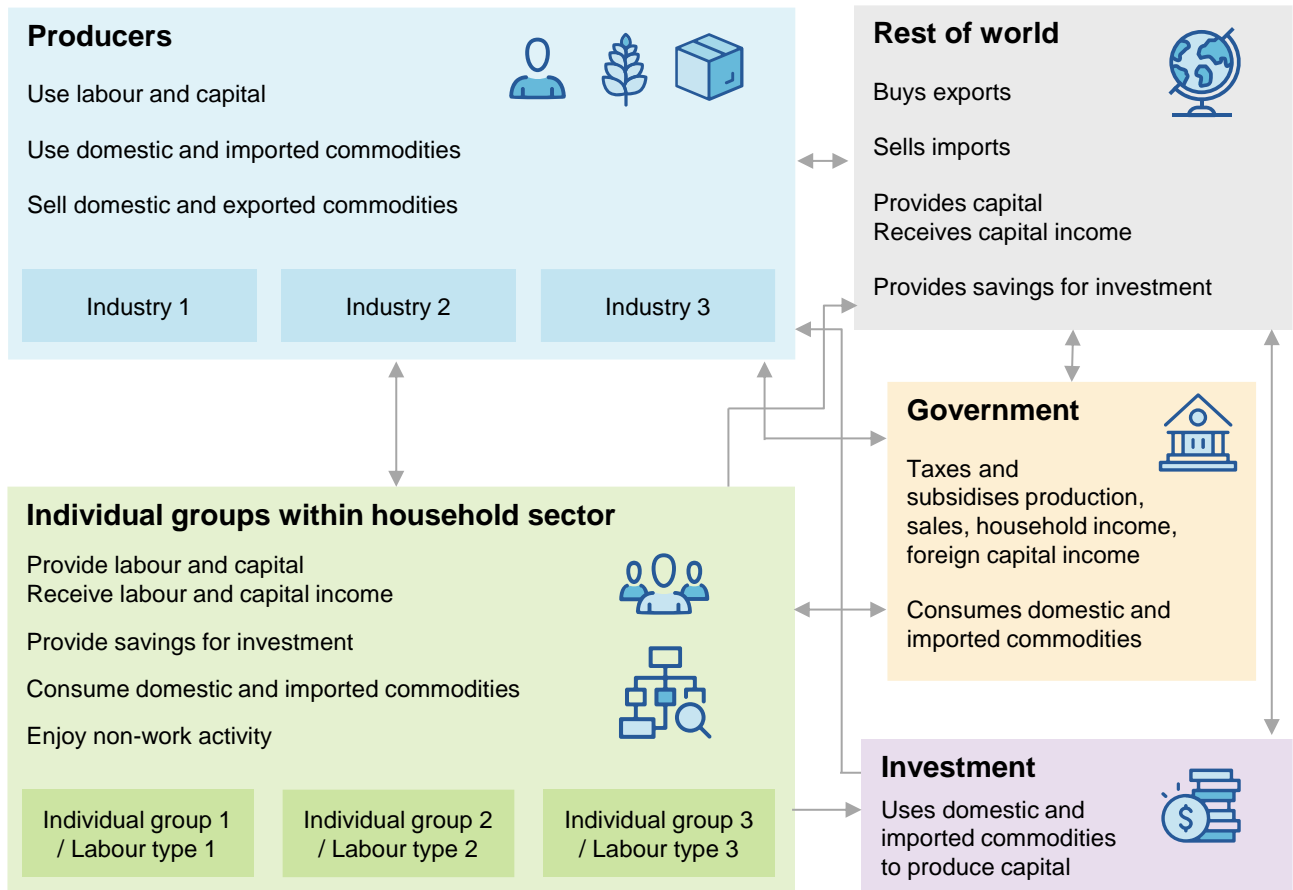
Furthermore, in a CGE model, one price (the 'numeraire') must be determined outside of the model² — in this model, the household consumption price index is chosen as the numeraire. All model prices are expressed relative to the numeraire.

More detailed descriptions of the model structure by each major entity or activity, including choices around which variables are determined within the model and which are given outside of the model ('closure' assumptions), are covered below. Box 1.1 summarises the main closure assumptions in the model, and chapter 5 covers equations illustrating relationships in the model.³

² This is due to Walras' law which implies that if all but one market clears, then the last market also clears and its market clearing constraint is redundant.

³ The model was built using the GAMS software and the equations formulated as mixed complementarity problems. This formulation allows for explicit pairing between an economic variable and its equation either as an equality or inequality constraint (Abrell 2017; Murphy, Pierru and Smeers 2016). For example, a wage floor was implemented in some sensitivity testing simulations (chapter 4) as an inequality constraint, with unemployment as its paired variable.

Figure 1.1 – Simple illustration of model structure^a



a. Arrows indicate value flows originating from one sector and flowing to another sector. For example, the grey arrow linking producers to individual groups indicate payments flowing to individual groups for use of labour and capital, and to producers for purchases of commodities.

Box 1.1 – Summary of closure assumptions

Closure refers to the choice of variables that are determined within the model (endogenous variables) and those that are given outside of the model (exogenous variables). Key closure assumptions in the main model simulations are listed below. Some of these assumptions are changed in sensitivity testing analysis (chapter 4).

- The rate of return to capital (defined as the rental price of capital relative to the price of investment) is exogenous. Capital is mobile across any industry, and the size of the capital stock is determined through demand from the production sector, given the rental price. This implies a long-run assumption in which the size of the capital stock is flexible.
- Investment is determined through its relationship with the capital stock — if the capital stock increases, more investment is required to maintain that capital stock. Domestic saving and the domestic capital stock endogenously adjust to meet the level of investment and capital required.
- The quantity of foreign investment and the foreign capital stock are exogenous. This assumes that the availability of foreign investment and foreign ownership of capital are limited, and not affected by domestic variables or policies. It also means that the current account deficit (which equals foreign investment inflows) is fixed relative to the price of investment, and movements in the balance of trade are also limited.
- The international prices of imported commodities are exogenous. This implies that Australia takes world prices of imports as given. The total quantity of imports is determined through demand from users at given prices.
- Foreign demands for Australian commodities are based on fixed downward sloping demand curves. This assumes that Australian exporters have some market power in the world market.
- Government expenditure is determined through its relationship with GDP — the size of government spending grows linearly with GDP. Government spending is assumed to have no effect on the model's productivity parameters.
- Government tax rates are exogenous, except for household income tax rates that endogenously adjust to balance the government budget. The amount of household income tax enters as a lump sum into individual group decision making processes in a non-distortionary way.
- Each individual group has a fixed time endowment that can be allocated between labour and leisure. Wage rates are determined through market clearing of individual group labour supply decisions (via a utility maximisation process) and industry labour demand decisions (via a cost minimisation process). Any type of labour supplied can be used across any industry (that is, labour is perfectly mobile).

1.1 Individual group decision process

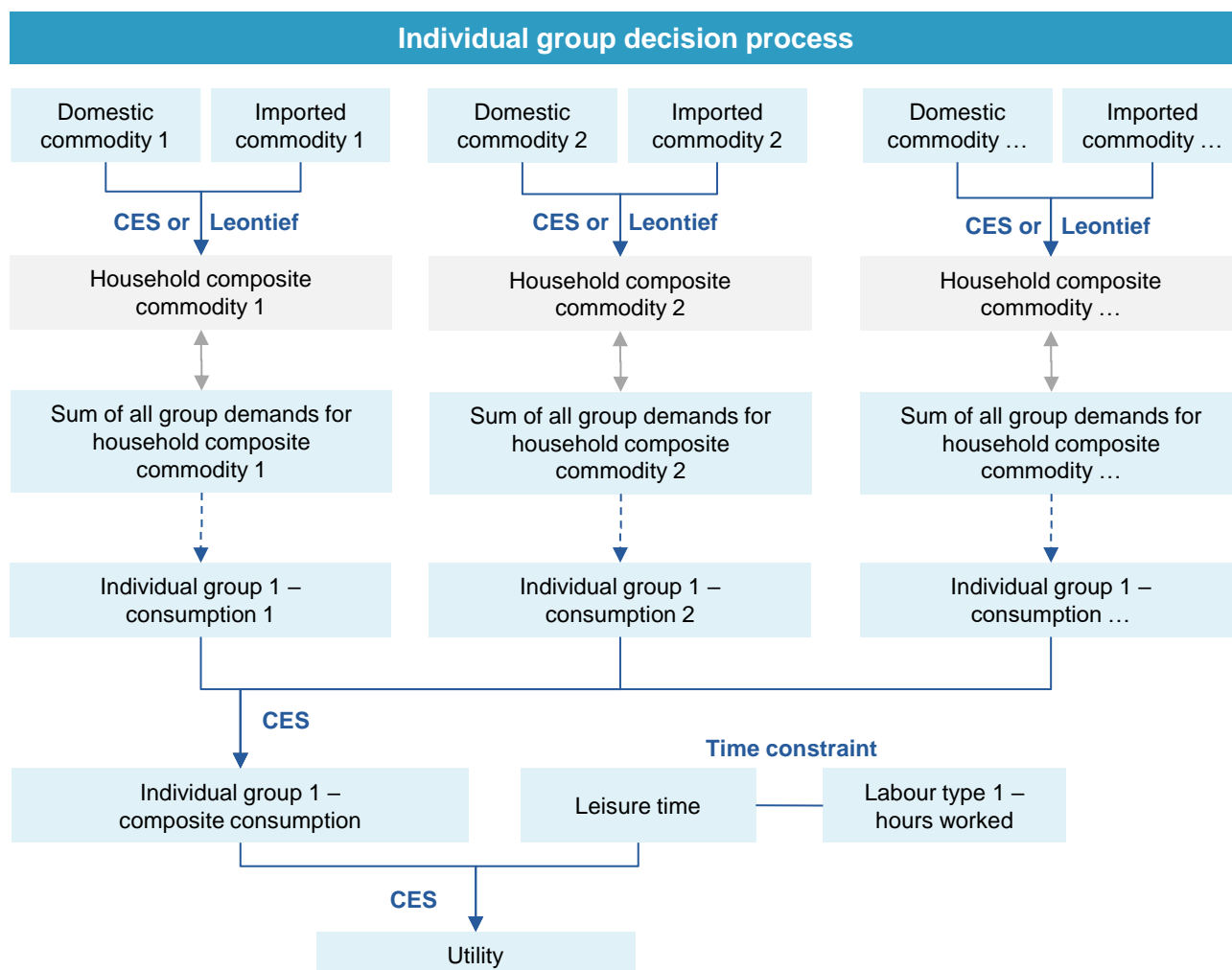
The household sector is split into individual groups to enable analysis of reforms that may affect different groups in different ways. For example, these groups can represent individuals that are likely to be affected differently by proposed reforms to schooling and tertiary education (chapter 3). Simulated shocks to the productivity of industries can also have differential effects on these groups depending on the composition of labour used by the industries. Individuals are grouped according to their combinations of:

- age group — 15-24, 25-34, 35-44, 45-54, 55-64, 65+
- gender — male, female
- highest education level — 'Up to Year 12 or Cert I/II', 'VET Cert III/IV or Diploma', 'Bachelor degree or higher' (or school-, VET- and university-educated for simplicity).

Figure 1.2 illustrates the nested decision process for individual groups to consume commodities (goods and services) and supply labour. Individual groups seek to maximise their utility, which is a constant elasticity of substitution (CES) function of 'leisure' (any time not spent in work) and a 'composite' consumption good (a bundle of commodities they consume), subject to their budget constraint and a time constraint.⁴ The budget constraint comprises labour and capital income, less saving and income taxes, to fund consumption. Saving and income taxes enter the budget constraint in a non-distortionary way as lump sum values. The time constraint allocates a fixed time endowment between leisure and hours worked.

Individual groups also choose how much of each household composite (of domestic and imported commodities) they consume, by minimising their expenditure to meet a given quantity of the composite consumption good (determined from the above utility maximisation problem), via a CES function.

⁴ The model includes the option of a wage floor, which can drive a wedge between hours actually worked and available labour, creating unemployment endogenously. A wage floor can illustrate the effects of wages that are sticky downwards, for example due to long-term contracts or labour market rigidities. The wage floor is used to test the sensitivity of some modelled scenario results. It is implemented via an intermediate household decision, where individual cohorts first choose how much they would like to work, given prevailing wages and prices. If there is a binding wage floor, labour supply will exceed labour demand, inducing unemployment.

Figure 1.2 – Individual group decision process^{a,b}

a. Blue text describes relationships between different components of this diagram. Grey shading indicates a component that is subject to product taxes. Dashed arrows indicate that only some components of a sum are detailed in the diagram. Grey arrows indicate that market clearing conditions balance demand and supply. **b.** A CES relationship was used to create composites of domestic and imported commodities, and a Leontief relationship was used where there were no imports of a commodity in the database.

1.2 Industry production processes

The model has 17 industries on the production side (listed below), based on the main industries of interest for the inquiry's simulations (for example, 'school education' and 'technical, vocational and tertiary education' were separated due to separate reforms simulated for school education and higher education). Some industries were also separately identified due to their more distinctive production or expenditure structures (for example, construction is heavily used by the investment sector):

1. Agriculture, forestry and fishing
2. Mining

3. Advanced manufacturing⁵
4. Other manufacturing
5. Construction
6. Transport and wholesale
7. Retail trade
8. Hospitality
9. Technology and telecommunications⁶
10. Financial services
11. Professional, scientific and technical services
12. School education
13. Technical, vocational and tertiary education
14. Health and social services
15. Public administration
16. Other services⁷
17. Ownership of dwellings.

Figure 1.3 illustrates the nested production process for a given industry. Inputs are used to create outputs at each stage of the process via a cost minimisation decision for given levels of output, subject to assumed CES, constant elasticity of transformation (CET) and Leontief production functions.

The two factors of production used are capital and labour, the quantity of which are both flexible. Capital inputs and each labour type input are also perfectly mobile; that is, they can be used across any industry (there are no industry-specific labour types or capital). However, each industry has their own production functions to determine the composition of labour types and composition of labour and capital used.⁸

Alongside these factors of production, producers in each industry use intermediate inputs to produce industry outputs. Both domestic and imported commodities are combined to form composites of intermediate inputs.

Across the production functions for creating composite labour, composite factors (value added, combining labour and capital), and industry output, there were productivity parameters included to allow adjustments to labour-augmenting technical change, multifactor productivity, and input-neutral technical change respectively. These parameters were adjusted in various model simulations (chapter 3).

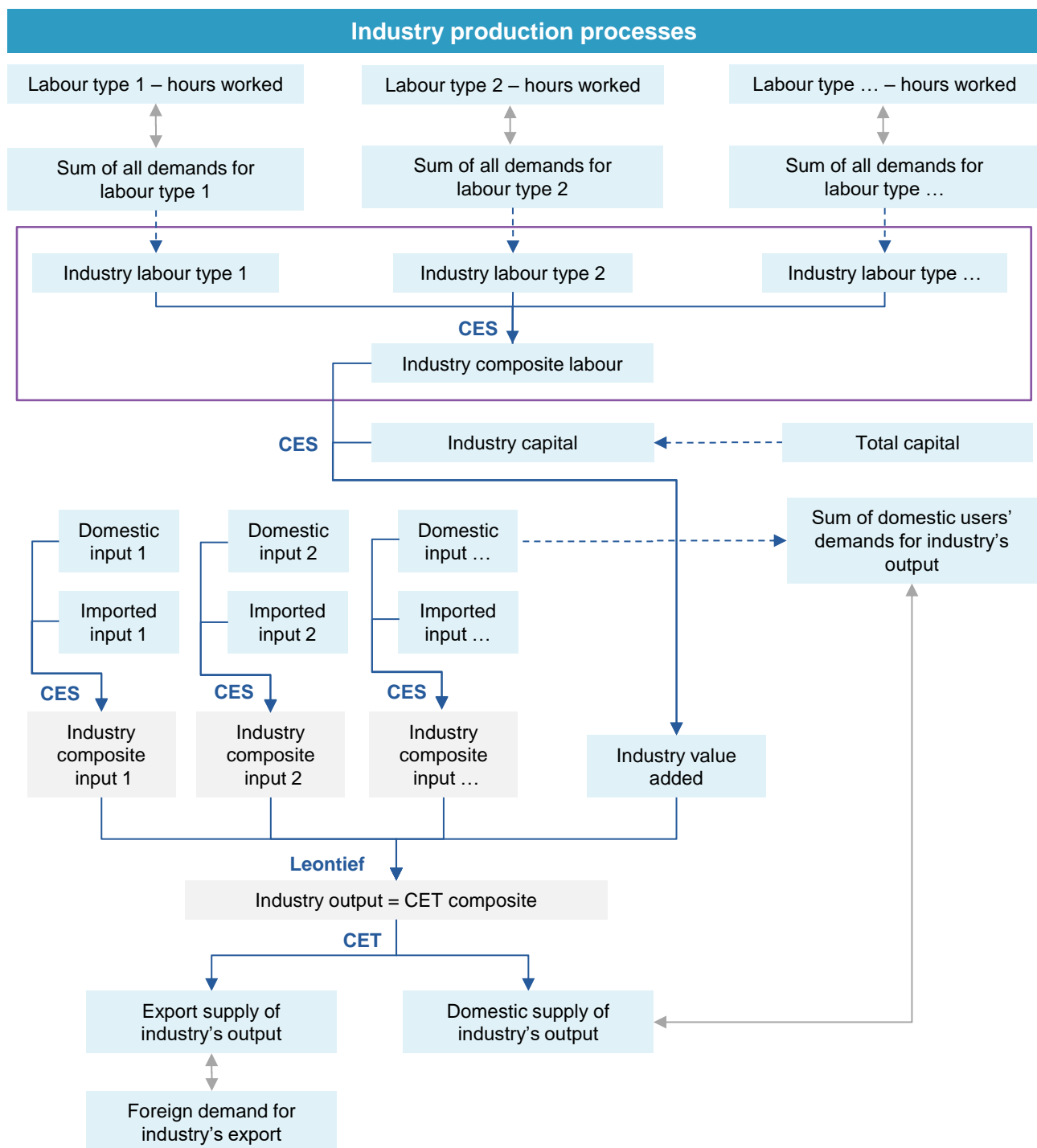
⁵ Industries that comprise 'advanced manufacturing' were identified with reference to industries listed in a study of Australian advanced manufacturing (DIIS and IP Australia 2017, pp. 85–86). These include industries covered under 'basic chemical manufacturing', 'cleaning compound and toilet preparation manufacturing', 'transport equipment manufacturing' and 'machinery and equipment manufacturing'.

⁶ 'Technology and telecommunications' includes 'internet service providers, internet publishing and broadcasting, websearch portals and data processing', 'telecommunication services' and 'computer systems design and related services'.

⁷ 'Other services' include energy and utilities, rental and real estate services, administrative and support services, arts and recreation, repair and maintenance, and personal services. These services were grouped together for the model because they were not separately considered to be key industries of interest for the simulation scenarios.

⁸ There are two CES processes for creating composite labour for each industry. The first involves combining age-sex labour combinations to create a composite labour by education level. The second involves combining each education-level labour composite into a single industry composite labour. Note that while producers are not actually able to discriminate in their hiring choices by age group or sex, assuming imperfect substitution of labour by age group and sex in the model provides a simple way of reflecting differences that exist due to people's preferences for working in certain industries.

Figure 1.3 – Industry production processes^{a,b,c}



a. Blue text describes relationships between different diagram components. Grey shading indicates a taxed component (either a product tax or production tax). Dashed arrows indicate that only some components of a sum are detailed. Grey arrows indicate that market clearing conditions balance demand and supply. **b.** The purple box is a simplified representation of the creation of composite labour in each industry. In the model, there are two CES nests in this process. The first involves combining age-sex labour combinations to create a composite labour by education level for each industry. The second involves combining each education-level labour composite into a single industry composite labour. **c.** The 'ownership of dwellings' industry does not employ labour in the data, so is only produced using capital and intermediate inputs.

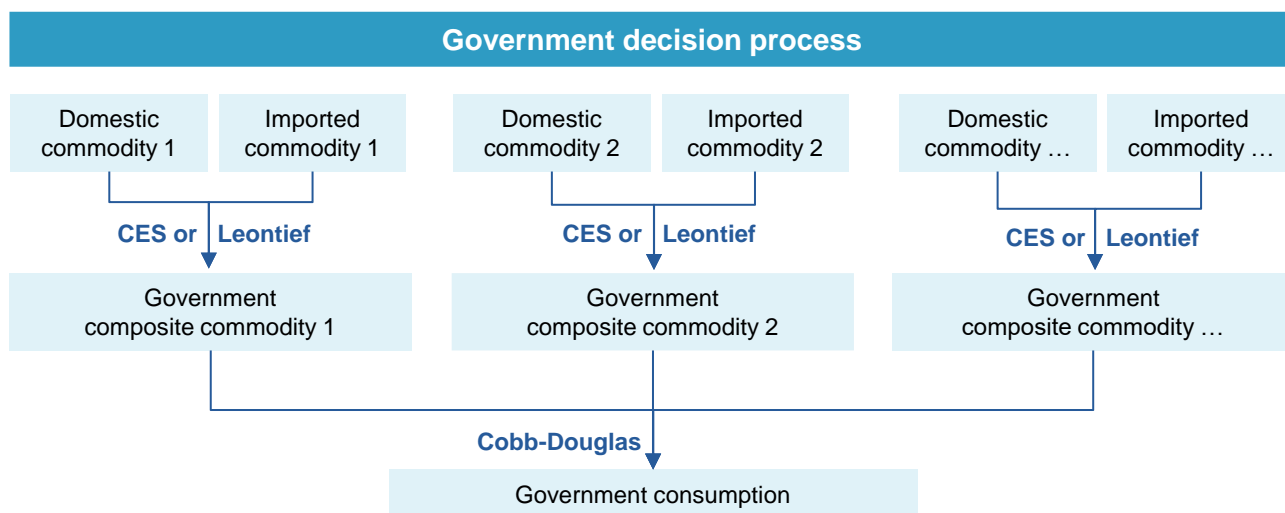
Producers also make choices about whether industry outputs are exported or used domestically via a CET function. Given the relatively broad industries used in the model, this decision could arise because the composition of more granular commodities (not separately modelled) exported by an industry may be different from the composition of granular commodities sold domestically.

1.3 Government decision process

Figure 1.4 illustrates the government decision process. There is one government entity, which purchases composite commodities (made up of domestic and imported commodities) according to a Cobb-Douglas consumption function, subject to its budget constraint. The government budget constraint comprises net tax revenues (less subsidies) from production (including industry-specific taxes levied on the value of production, and taxes levied on sales with rates that differ by the commodity and the buyer of that commodity), household income taxes and foreign capital income taxes. The Cobb-Douglas relationship implies that expenditure shares are constant — that is, the government allocates a fixed share of its total expenditure to consumption of each commodity. The total nominal value of government consumption is also assumed to be a fixed share of nominal GDP, so grows with GDP growth.

Government tax rates are fixed, except for household tax payments, so revenue largely moves in line with the various tax bases. Household tax payments adjust to balance the government budget constraint. Each individual group’s tax rate scales according to the total value of tax the government requires under the simulation relative to the base scenario.

Figure 1.4 – Government decision process^{a,b}



a. Blue text describes relationships between different diagram components. b. A CES relationship was used to create composites of domestic and imported commodities, and a Leontief relationship was used where there were no imports of a commodity in the database.

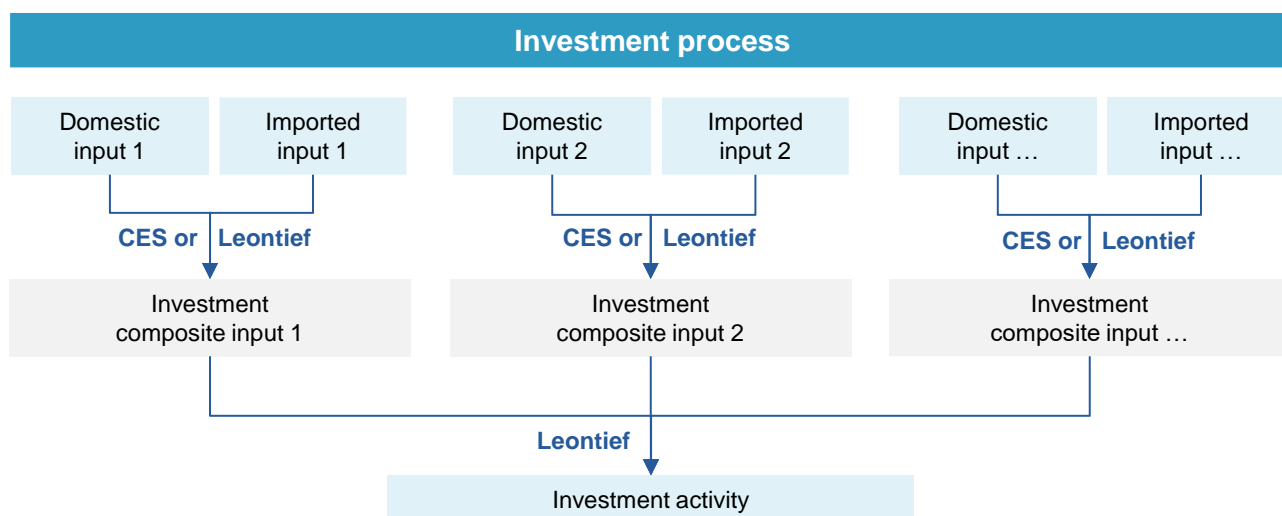
1.4 Investment and capital processes

The size of the capital stock is assumed to be variable, while the rate of return to capital (defined as the price of capital relative to the price of investment) is fixed. It is also assumed that investment and capital relationships are in steady state, and that the ratio of real investment (new capital) to real capital (the capital stock) is fixed — that is, a fixed quantity of investment is required to keep the capital stock constant due to capital depreciation.

Figure 1.5 illustrates the investment process. The investment sector uses domestic and imported commodities to produce composite inputs, which it then uses in fixed shares to invest in capital (via a Leontief function).

Capital is owned by domestic and foreign investors, and savings from individual groups and foreign investors are used to fund investment activity. Real foreign investment and the capital stock owned by foreigners are assumed to be fixed. This means that only savings by domestic investors adjust to meet the value of investment activity, and similarly for the capital stock. Each individual group's saving rate and capital to saving ratio scale according to the total value of domestic saving and capital required under the simulation relative to the base scenario.

Figure 1.5 – Investment process^{a,b}



a. Blue text describes relationships between different diagram components. Grey shading indicates a component that is subject to product taxes. b. A CES relationship was used to create composites of domestic and imported commodities, and a Leontief relationship was used where there were no imports of a commodity in the database.

1.5 The rest of the world

Australia interacts with the rest of the world via trade in commodities, foreign investment and supply of foreign capital. Foreign supplies of imported commodities are assumed to be perfectly elastic at a given international price. The exchange rate changes relative to the household consumption price index. Total Australian demand for an imported commodity is the sum of demands from household, production, government and investment sectors. Foreign demands for Australian commodities are based on downward sloping demand curves. Total outflows from Australia to the rest of the world equal total inflows.

1.6 Model structure limitations

The model structure means that it is not able to produce detailed results of some aspects of the economy. For example, it is not able to comment on effects across more granular industry groupings (than the 17 that have been explicitly defined in the model), different states or regions of Australia, different types of capital, occupations, or dynamic effects over time. The measure of hours worked also does not differentiate between changes due to more people gaining employment or existing workers working more hours.

Other simplifying assumptions may also have an effect on model results. For example, the main model assumptions do not contain 'fixed factors'; that is, factors that are assumed to be in fixed supply (such as

land, which is especially important for agriculture and mining). Inclusion of a fixed factor would involve assuming some portion of payments currently allocated to capital or labour are instead allocated to the fixed factor. Allocating some share of capital to land as a fixed factor would mean that the production sector has more limited scope to expand, and some aggregate effects in the economy may be smaller than seen under the current model, because land cannot grow via investment. Some of the effects of constraining factors of production are examined as part of sensitivity testing (chapter 4).

In addition, it is assumed that the rate of return to capital, foreign capital and real foreign investment are fixed in the model. It is possible that some policy reforms that improve productivity could increase rates of return and induce greater foreign investment. These dynamics are not examined in this model.

Capital and investment are also assumed to be in steady state, with investment being equal to depreciation. However, data on capital and investment for a particular year might not reflect a steady state economy — due to mismatches between the timing of investment decisions and depreciation, or because investment and the capital stock are growing over time. The model and use of data for calibrating parameters (chapter 2) does not account for this possibility. Therefore the size of the investment sector (and use of inputs used to create investment) may differ from an actual steady state economy.

Furthermore, an attribute of the CES function, which is used in individual group decisions to consume commodities, is that expenditure elasticities are unitary — a 1% increase in income or expenditure is associated with a 1% increase in demand for commodities. Past research suggests that this is unlikely to be the case; for example, people may dedicate some amount of expenditure to a bundle of necessities first, irrespective of income, before choosing to spend their remaining income on other goods and services (Gharibnavaz and Verikios 2018). The CES functional form means that, for industries that supply commodities for which demand usually rises with increasing income levels, simulated growth may be lower than it otherwise would be.

Given model structure limitations, along with the stylised way in which simulated shocks have been implemented (chapter 3), the simulation results should not be interpreted as being the absolute effects of reform. Nevertheless, the model structure provides a tractable means of illustrating some whole-of-economy effects of the stylised scenarios.

2. Data sources and parameters

The initial values of the model's variables (of prices and quantities for example) and the estimation of parameters (such as share parameters in Cobb-Douglas functions) require a database that reflects the Australian economy. The values, prices and quantities in the database are then used to solve for unknown model parameters through a process known as 'calibration'. As model databases usually contain data on *values* of production and expenditure (equal to prices multiplied by quantities), rather than prices or quantities separately, it is conventional to assume that prices are normalised to be one. This allows quantities to be estimated as values divided by prices. Where there are indirect taxes, tax-exclusive prices are normalised to be one, and then adjusted by applicable tax rates to estimate 'purchaser prices', in order to determine quantities. This convention has been applied in the calibration process for most parameters in this model.

In some functions, there are more unknown parameters to solve for than there are available data on prices and quantities. Consequently, some model parameters have to be assumed to allow the other model parameters to be calibrated — for CES functions, usually the elasticity of substitution is assumed or drawn from the literature.

This chapter describes the data used to form the model's database, and the elasticities assumed in the model.

2.1 The social accounting matrix

An aggregate social accounting matrix (SAM) was developed to form the backbone of the model's database.⁹ This contains aggregate flows between the model industries, commodities, capital and labour, the household sector, government sector, investment sector, and the rest of the world. This was supplemented by an Input-Output (IO) table that contains more detail on use of domestic and imported commodities and product taxes.

The ABS National Accounts IO tables were the main data source for the model's SAM. The tables contain data that 'provide detailed information about the supply and use of products in the Australian economy, and the structure of and inter-relationships between Australian industries' (ABS 2021a). This data is categorised into 114 'Input Output Industry Groups', which were then aggregated to the model's 17 industries.

Data from 2018-19 was used because production activity in the more recent 2019-20 data may reflect the impacts of COVID in 2020. For consistency, 2018-19 sources of data were used for other values in the model's database where available. 2018-19 data was not available for some sources needed to estimate variables by individual group (described below), in which case data from the closest year to 2018-19 was used, and adjusted for the 2019 population.

⁹ A SAM records data on transactions (inflows and outflows) between economic agents in an economy. It is a square matrix where each row and column represents an activity, commodity, factor or institutional sector. Each cell shows the payment from the column account to the row account. The SAM must be balanced — that is, all inflows must equal outflows for a particular account. The structure of the SAM (that is, the economic agents included and the flows between them) must also concord with the CGE model's structure and equations.

The value of foreign capital income was informed by data in the Balance of Payments (ABS 2021b). For other cells in the aggregate SAM where the values were not given in the ABS IO tables (such as household income tax payments and savings), values were calculated as the remainder of the row or column total to ensure the SAM was a balanced matrix.

As described in chapter 1, the model's household sector is split into individual groups or labour types — for example, income and expenditure differ by individual group — which is not reflected in the aggregate SAM. Additional data sources were used to reflect this heterogeneity in the model database (described below). The heterogeneity was achieved by calculating *shares* attributable to labour types and individual groups, which were then used to apportion the values in the SAM. The sums across labour types and individual groups must equal the corresponding cells in the aggregate SAM, to ensure that the SAM remains balanced.

2.2 Expenditure, factor incomes, and income tax by individual group

Expenditure by individual group

Each individual group within the model consumes a proportion of total household consumption of commodities. Data from the 2015-16 Household Expenditure Survey (HES) (ABS 2017) was used to estimate these proportions.

To estimate person-level expenditure, household expenditure was apportioned to each person over 15 years old in the household according to their contribution of disposable income to the household. This was necessary as the expenditure data in the HES is collected at a household level, but the model's individual groups are based on person-level characteristics.

The amount of expenditure on each industry in the model was estimated by mapping HES expenditure classifications (which use the Household Expenditure Classification) to the 17 model industries. This was done using concordances and information in IO tables on production of commodities by industry. Negative expenditures in the HES, arising for example from sales of cars and dwellings, were also removed as the inclusion of these sales is inconsistent with the definition of expenditure in the model.

The person-level expenditures by industry were then used to calculate the proportion of expenditure by each individual group in the household sector of the model (adjusted to the 2019 population). These proportions were applied to aggregate household expenditure by industry in the SAM to estimate the expenditure for each individual group.

Labour and capital income, and income tax by individual group

The amounts of labour income received by each individual group working in each industry, as well as capital income received and income tax paid by each group in the model, are based on proportions calculated using data from the 2017-18 Survey of Income and Housing (SIH) (ABS 2019b).

The method used to calculate the proportions for each variable in the model was essentially the same, but different variables from the SIH were used. For example, for income tax paid, the aggregate weighted income tax paid and the share of the total paid by each group was calculated and adjusted to the 2019 population. These proportions were then applied to aggregate household income tax in the SAM to estimate the amount of tax paid by each group. A similar process was undertaken to estimate labour and capital income for each group in the model.

2.3 Normalised hours

Normalised time endowment

Each individual group in the model has an exogenous time endowment, representing the total amount of time they can choose to allocate between work and leisure activities. These time endowments were normalised to a value of 1 per person in the group's population. Individual group populations were based on Australian demographic statistics on the Estimated Residential Population at June 2019 (ABS 2019a). Normalising total time per person to 1 means that changes to population size can be easily interpreted in terms of numbers of people, and it allows wage rates (calibrated from normalised hours worked below) to be more easily compared across individual groups because they are in terms of the same time units.

Normalised hours worked

A range of values have been used in the literature to represent the ratio of hours worked to total time available (usually at the population level rather than at an individual group level). Parameters range from about 0.3 to 0.9 in different models (based on Boeters and Savard 2013, p. 1654; Dixon and Nassios 2019, p. 7; Hinson, Wende and Womack 2020, p. 24; Turnovsky 2002, p. 1774), which do not usually imply a total of 24 hours per day or a standard work week of 40 hours. Values are sometimes chosen to achieve plausible labour supply elasticities. Boeters and Savard (2013, p. 1653) argue that the ratio should be such that the income elasticity of labour supply is within an empirically plausible range.

The parametrisation of hours worked in this model assumes a ratio of total hours worked to total time available in the population of 0.5. That is, half of potential time available is spent working, while the other half is spent on leisure activities. This determines total normalised hours worked across the *population*.

Normalised hours worked at the *individual group* level was then determined using estimates from the 2017-18 SIH (ABS 2019b) on the share of total hours worked attributed to each group (adjusted to the 2019 population). These shares were applied to *population* normalised hours worked in order to calculate normalised hours worked for each *group*.

Using this method, the ratio of hours worked to total time varies greatly across individual groups, ranging up to about 0.9 for some prime working age groups, and down to about 0.1 for retirement age groups. The implied income elasticities of labour supply¹⁰ also vary greatly across groups, with an aggregate elasticity of about -0.5. This is larger in magnitude than the plausible value suggested in the literature of about -0.1, though is similar to plausible values suggested for lone parents (Boeters and Savard 2013, p. 1654; Giesecke et al. 2021, p. 5934). An alternative approach to determining the ratio of hours worked to total time, that achieves a more plausible income elasticity of labour supply, is discussed below.

The implied wage elasticities of labour supply differ across individual groups as well, with labour supply responses tending to be higher for women and for less educated groups, and an aggregate elasticity of about 0.2. These patterns across sex and education level are consistent with the literature, and the aggregate elasticity is within ranges in other studies of about 0.1 to 0.3 on average across men and women (based on estimates cited in Dandie and Mercante (2007, pp. 37–39) and Dixon and Nassios (2019, pp. 9–

¹⁰ Note that the income elasticity of labour supply is not the same as the wage elasticity of labour supply, which is discussed subsequently. The income elasticity of labour supply is calculated as the change in labour supply with respect to a change in non-labour income by an amount that would increase total disposable income (from labour and non-labour sources) by 1% if labour supply did not react (Boeters and Savard 2013, p. 1653).

10)), but is higher than the elasticities of slightly less than 0.1 that were calibrated in an Australian CGE study (Dixon and Nassios 2019, p. 9).

In the calibration process, using data on normalised hours worked (a quantity variable) means that wage rates (a price variable) are estimated by dividing labour income values by normalised hours worked for each individual group, rather than being normalised to one like other prices. Calibrated wage rates per normalised hour were higher for men and more highly educated groups, consistent with actual data on the Australian economy.

Normalised time and hours worked for sensitivity testing

An alternative approach to determining the ratio of hours worked to total time was also examined, with discussions of simulations using this approach covered in the sensitivity testing chapter (chapter 4). Under this approach, a ratio of hours worked to total time was assumed in order to produce income elasticities of labour supply closer to the range suggested in the literature. It was also assumed that women had larger labour supply responses than men, and that school-educated groups had larger responses than more highly educated groups.¹¹ Total time available to each cohort was determined by applying the assumed ratios to the individual group-level normalised hours worked from the previous approach.

Using this method, income elasticities of labour supply ranged from about -0.08 for more educated men to -0.15 for less educated women, with an aggregate elasticity of about -0.10, which is similar to that suggested in the literature, noted above. Elasticities of labour supply with respect to wages were relatively low, with an aggregate elasticity of about 0.02 (which corresponds more closely to elasticities for married men in the literature cited above).

Normalised unemployed hours for sensitivity testing

The primary model simulations assume that there is no unemployment, and that labour markets fully clear. The existence of unemployment was assumed in some sensitivity testing simulations (chapter 4). In these simulations, an initial value of normalised unemployed hours was required for each individual group. Detailed Labour Force Survey data for 2018-19 (ABS 2022a) was used to estimate these values. Available information on unemployment by age-sex-education group was used to inform how hours sought (available only by age and sex) might be distributed across different education levels. To then calculate *normalised* unemployed hours, the ratio of hours worked to hours sought was estimated for each group, and applied to normalised hours worked.

2.4 Other individual group values

The value of saving by each individual group was calculated as a remainder from individual group income and expenditures. For some individual groups (typically younger and female groups), the value was negative, likely because they tend to be living in households where higher income earners supplement their proportional household spending. The interpretation in the model is such that some 'saving' by positive-saving groups is transferred to negative-saving groups so that the latter groups can consume more. The sum of individual group savings equals household savings in the aggregate SAM.

¹¹ As cited in Giesecke et al. (2021, p. 5934), past research suggests that income elasticities of labour supply for married women are more negative than for married men, and elasticities for lone parents are more negative than for couple families. Lone parents have also been found to have lower levels of education on average (ABS 2007).

An initial quantity of utility is also required for each individual group. Utility is a conceptual construct, and is not observable in data. Initial utility was normalised to be 1 per person in each group, which implies that each person's utility is equally important to begin with. Changes in utility values were converted to equivalent variation estimates (expressed in monetary terms) for ease of interpretation in the analysis of simulations (chapter 3).

2.5 Elasticities

Table 2.1 outlines the elasticities used in the model, including the values used in the base model and those used in sensitivity testing (chapter 4). The elasticities were informed by the literature and existing models where possible, and tested at a technical workshop with external CGE modellers. Elasticities for which there was greatest uncertainty were sensitivity tested.

Table 2.1 – Assumed elasticities

Parameter	Base value	Sensitivity testing	Comments and sources
Individual groups in household sector			
CES elasticity of substitution between consumption and leisure	1.1	None	Base value based on Dixon and Nassios (2019). Background research included: Agbahey, Siddig and Grethe (2020); Boeters and Savard (2013); Fox (2002); Qi (2014)
CES elasticity of substitution between composite consumption commodities	0.5	0.3 to 0.7	Hinson, Wende and Womack (2020); Murphy (2018)
Industry production			
CES elasticity of substitution between (composite) labour and capital	0.5	0.3 to 0.9	Base value based on Hinson, Wende and Womack (2020). Background research included: PCNational model (unpublished); Bullen et al. (2021); Cheong and Sonnenschein (2012); Gechert et al. (2019); Kopecna, Scasny and Recka (2020); KPMG Econtech (2010); Independent Economics (2015); Murphy (2018); Sanchez (2004)
CES elasticity of substitution between different types of labour	4 (by age-sex) 3 (by education)	2.0 to 6.0 (by age-sex) 1.5 to 5.0 (by education)	Values based on feedback from modelling workshop participants. Background research included: Autor (2018); Blankenau and Cassou (2011); Cheong and Sonnenschein (2012); De Giorgi (2013); Ghosh (2018); Guisinger (2020); Havranek et al. (2020); Jerzmanowski and Tamura (2020); KPMG

Parameter	Base value	Sensitivity testing	Comments and sources
			Econtech (2010); Merette (2007); Murphy (2018)
Trade			
CES elasticity of substitution between domestic and imported commodities — for household, production, government and investment sectors	1.12 (agriculture, forestry and fishing)	None	Values based on KPMG Econtech (2010) and feedback from modelling workshop participants. Background research included: PCNational model (unpublished); Cheong and Sonnenschein (2012); Clements, Mariano and Verikios (2020); Delahaye and Milot (2020); Go (1994); Hinson, Wende and Womack (2020); Sanchez (2004); Independent Economics (2015); Hertel and van der Mensbrugge (2019); Verikios et al. (2021)
	3.42 (mining)		
	2.12 (advanced manufacturing)		
	2.69 (other manufacturing)		
	0.25 (transport and wholesale)		
0.30 (hospitality; technology and telecommunications; professional, scientific and technical services; other services)			
0 (all other industries)			
CET elasticity of transformation between exports and domestic commodities	2.5	None	Value based on feedback from modelling workshop participants. Background research included: Cheong and Sonnenschein (2012); Go (1994); Independent Economics (2015); KPMG Econtech (2010); Verikios et al. (2021); Warr and Lapiz (1994)
Price elasticity of export demand	-3 for industries where Australia has more price-setting power (agriculture, forestry and fishing; mining; advanced manufacturing; transport and wholesale; hospitality; school education; technical, vocational and tertiary education) -4 for other industries	None	Values based on feedback from modelling workshop participants. Background research included: Adams, Dixon and Horridge (2015); Hinson, Wende and Womack (2020); Independent Economics (2015); KPMG Econtech (2010); Verikios et al. (2021)

3. Simulations and output variables

3.1 Summary of simulations

This chapter provides a summary of the simulations run for the Productivity Inquiry. The modelling shows how stylised representations of select reforms could flow through the economy given the defined relationships between the various sectors of the economy in the model.

Table 3.1 lists the modelled scenarios, while the key results from each simulation are presented in the appendices of the relevant companion volumes of this inquiry. Shocks were dimensioned based on estimates from the literature where possible and were tailored for the specific scenarios modelled. Sensitivity testing was undertaken given the significant uncertainty in potential shock sizes and the relevance of the literature. Depending on the nature of the scenario, productivity shocks were implemented as an improvement in either:

- the input-neutral technical change parameter, which results in all production inputs (labour, capital and intermediate inputs) being used more productively such that more output can be produced using the same level of input
- the multifactor productivity parameter, which results in labour and capital being used more productively
- the labour-augmenting technical change parameter, which results in labour being used more productively.

The scenarios do not include modelling of the costs of implementing reforms (which could include, for example, changes in the use of intermediate inputs, changes to fiscal budgets, adjustment costs). These costs are also highly uncertain and depend on the specifics of the implementation process. Costs and other considerations in reform implementation are discussed in other volumes of this inquiry.

The results from one scenario should not be directly compared with another, as there are significantly different levels of confidence in the size of the potential reform impact and/or the ability to represent the reform in the model.

Table 3.1 – Summary of simulations

Report volume	Scenario description	Shocked parameter	Size of shock	Sensitivity testing values	Rationale
<i>Innovation for the 98%, appendix A</i>	[1] Increasing productivity through better diffusion of new business models, technologies, management capabilities, and data use	[1a] Input-neutral technical change parameters were increased for each industry (excluding 'ownership of dwellings') in 16 separate simulations	1%	None	Assumed for illustrative purposes only.
		[1b] Input-neutral technical change parameters were increased for the above industries in a single simulation	1%	0.5 to 1.5%	
<i>Australia's data and digital dividend, appendix B</i>	[2] Increasing productivity in regional and remote areas through better access to digital infrastructure, leading to more uptake of technology and data tools	Multifactor productivity parameters were increased for the 'mining' and 'agriculture, forestry and fishing' industries	0.5%	0.2 to 1%	A meta-analysis suggests that a 10% increase in use of information and communication technologies (ICT) is associated with a 0.5% increase in output (Cardona, Kretschmer and Strobel 2013, pp. 118–119). For illustrative purposes in this shock, it was assumed that the improvement in digital infrastructure in regional and remote areas would lead to such an increase in ICT use. The 'mining' and 'agriculture, forestry and fishing' industries were shocked, as they have much higher shares of labour (as a proxy for output) in outer regional and remote areas, based on analysis using 2016 Census data (ABS 2016b).

Report volume	Scenario description	Shocked parameter	Size of shock	Sensitivity testing values	Rationale
<i>From learning to growth, appendix B</i>	[3] Changing the composition of labour towards more highly-educated workers (to better meet labour market needs/shortages)	Among 15-24 year old groups, there was a change in population composition by education level	10% increase in number of university-educated people 4% fall in number of VET-educated people Decrease in school-educated so that 15-24 year old population is unchanged	8 to 12% increase in number of university-educated	Assumed for illustrative purposes only, with reference to projections of employment growth by skill level (NSC 2022).
<i>From learning to growth, appendix B</i>	[4] Increasing the productivity of skilled workers by improving tertiary education quality – long run and very long run simulations	[4a] Improvements will take time as people go through the education system and enter the workforce, and will likely affect younger workers first. In this long run simulation, labour-augmenting technical change parameters were increased for university-educated labour aged 15-24 and 25-34	2%	1 to 4%	Based on a study (Braga, Paccagnella and Pellizzari 2016, p. 803) that found that a professor who is one standard deviation better increased students' earnings by about 5.4%, or about 5.5% of average earnings. The shock size was chosen to reflect that improvements in professor quality across the tertiary education industry would likely be less than one standard deviation.
		[4b] In the very long run, all university-educated workers will have been educated in the improved system. In this simulation, labour-augmenting technical change parameters were increased for all university-educated labour groups	2%	1 to 4%	
<i>From learning to</i>	[5] Increasing labour productivity of the school industry by better use of curriculum resources to save	[5a] The short run benefit was modelled by increasing the labour-augmenting technical change parameter in the 'school education'	3%	2 to 4%	The short run benefit was based on research that estimated that teachers would save about 3 hours per week from a centralised resources (Hunter,

Report volume	Scenario description	Shocked parameter	Size of shock	Sensitivity testing values	Rationale
growth, appendix B	teachers' time and improve practices, as well as better integration of technology within classrooms – short run, long run and very long run simulations	industry. Labour use in the 'school education' industry was assumed to be fixed. The capital stock was also assumed to have had time to change (consistent with other model simulations)			
		[5b] In the long run, younger workers will be the initial group of school leavers benefiting from teaching improvements. This was simulated by increasing labour-augmenting technical change parameters of 15-24 year old workers. The continued impact of improved labour productivity of workers in the school industry was also included (from scenario 5a). Labour use in the 'school education' industry was assumed to be fixed.	3% for school industry 2% for 15-24 year old groups 5% for 15-24 year old groups in the school industry	2 to 4% for school industry 1 to 3% for 15-24 year old groups 3 to 7% for 15-24 year old groups in school industry	Haywood and Parkinson 2022, p. 27). This was converted into a 3% increase in school labour productivity by assuming time gained would be spent on teaching (with teaching hours based on PC (2023, p. 11)) and have the same marginal productivity as other teaching hours. It was also adjusted for the fact that teachers comprise about 60% of the school workforce (ABS 2022b). Longer run benefits were based on converting extra teaching time into higher test scores and then higher wages later in life. Based on the literature, it was estimated that 3 additional teaching hours raises test scores by 0.12-0.18 standard deviations (Lavy 2015, p. F399; Wedel 2021), and that each standard deviation increase raises future wages by 9-18% (Chetty et al. 2011, p. 1613; Currie and Thomas 2001, p. 116; Rose 2006; Vu and Yamada 2022; Watts 2020). Multiplying these numbers and taking the midpoint results in about 2% higher wages.
		[5c] In the very long run, all workers that have completed school will have done so in the improved system. Labour-augmenting technical change parameters of all workers were increased to simulate these effects. The continued impact of improved labour productivity of workers in the school industry was also included (from scenario 5a). Labour use in the 'school	5% for school industry 2% for all other workers	3 to 7% for school industry 1 to 3% for all other workers	

Report volume	Scenario description	Shocked parameter	Size of shock	Sensitivity testing values	Rationale
		education' industry was assumed to be fixed.			
<i>A more productive labour market, appendix A</i>	[6] Increasing labour productivity by reducing unnecessary occupational licensing restrictions and thus lowering barriers to labour mobility	Labour-augmenting technical change parameters were increased for the following industries as they are more likely to employ workers subject to occupational licensing requirements: <ul style="list-style-type: none"> • construction • transport and wholesale • professional, scientific and technical services • school education • health and social services 	0.8%	0.3 to 1.6%	Based on a study (Bambalaite, Nicoletti and von Rueden 2020, p. 23) that found that a 1 unit reduction in an indicator measuring the stringency of occupational entry regulations improved labour productivity among 11 European countries by 1.6%. For the simulation, a 0.5 unit reduction in stringency was assumed, which translates to a 0.8% increase in labour productivity. Relevant industries were selected based on those that were more likely to have occupational licensing requirements.
<i>A more productive labour market, appendix A</i>	[7] Increasing the productivity of workers coming through permanent skilled migration by better matching the migration program to labour market needs	Labour-augmenting technical change parameters were increased for industries with a higher share of migrant workers	0.1% (construction; retail trade; hospitality; school education; public administration; other services) 0.2% (mining; other manufacturing; transport and wholesale; financial services; professional, scientific and technical	Scaled by 2% to 10%, instead of 5% improvement in labour productivity of migrants	For illustrative purposes, it was assumed that better matching of the migration program could increase the labour productivity of migrants by 5%. Census data of migrants (ABS 2016b, 2016a) was used to calculate the share of workers in each industry in 2016 who were primary applicants of permanent skilled visas, and who arrived in Australia between 2006

Report volume	Scenario description	Shocked parameter	Size of shock	Sensitivity testing values	Rationale
			services; health and social services) 0.3% (advanced manufacturing; technical, vocational and tertiary education) 0.6% (technology and telecommunications)		and 2016. Modelled shocks were based on multiplying the migrant shares by the labour productivity change.

3.2 Aggregate output variables

A range of aggregate outputs were calculated from the model results to analyse the overall effects of shocks. These outputs are at a whole-of-economy, industry and labour group (age, sex or education) level, and are summarised in tables 3.2 and 3.3 below. Detailed tables containing these results are available on the inquiry's webpage.

Table 3.2 – Whole-of-economy outputs

	Variable ^a
Output and expenditure	Nominal GDP
	Real GDP
	Real gross national income (GNI)
	Real consumption
	Real investment
	Real government expenditure
	Real exports
	Real imports
Prices^b	GDP price deflator
	Consumption price deflator
	Investment price deflator
	Government price deflator
	Export price deflator
	Import price deflator
	Real consumer wage (relative to CPI)
	Real producer wage (relative to GDP price deflator)
Real consumer capital rental rate	
Factors of production	Capital stock
	Total hours worked
	Labour productivity
Household wellbeing	Equivalent variation (\$ billion)
	Gini coefficient of inequality in consumption (percentage point change)
Trade	Current account deficit (percentage of GDP)
	Terms of trade

a. Measured in percentage change terms unless otherwise stated. **b.** Relative to the model's numeraire, which was the household consumption price index (chapter 1).

Table 3.3 – Output variables at industry and labour group levels^{a,b}

Variables at an industry level	Variables at a labour group level
Nominal output	Equivalent variation (\$ million)
Real output	Hours worked
Output price deflator ^b	Leisure hours
Labour hours used	Real labour income ^b
Capital used	Real capital income ^b
Real consumption of domestic commodities	Real savings ^b
Real investment of domestic commodities	Real income taxes ^b
Real government expenditure on domestic commodities	Real consumption ^b
Real exports by commodity	Average real consumer wage rate ^b
Real imports by commodity	Average wage gap (one labour group indexed to 100)
Domestic commodity price deflator ^b	Population (million) ^c
Export commodity price deflator ^b	
Import commodity price deflator ^b	

a. Measured in percentage change terms unless otherwise stated. **b.** Relative to the model's numeraire, which was the household consumption price index (chapter 1). **c.** Population composition changes only apply in simulation 3.

4. Sensitivity testing

Sensitivity testing was conducted to examine the extent to which some aggregate results would change with adjustments to uncertain assumptions. Sensitivity testing was undertaken to examine the effects of:

- high and low values of shock sizes (outlined in table 3.1)
- high and low values of select elasticities (outlined in table 2.1), specifically the:
 - CES elasticity of substitution between composite consumption commodities (identified as ‘household consumption elasticity’ in the charts illustrated below)
 - CES elasticity of substitution between composite labour and capital (industry factor elasticity)
 - CES elasticity of substitution between different types of labour (industry education labour elasticity, and industry age-sex labour elasticity)
- using an alternative method to determine total time endowments (and hence the initial split of time into labour and leisure) for each individual group in order to achieve income elasticities of labour supply that were closer to plausible values stated in the literature (as described in chapter 2)
- separately assuming that there are some constraints on factors of production, specifically that:
 - the capital stock is fixed
 - labour supply by each individual group is fixed
 - an initial portion of people are unemployed due to a wage floor; that is, wages are sticky downwards.¹²

The effects of these sensitivity tests on some key output variables (changes in real GDP, hours worked, real consumer wages, and EV) are illustrated for select model simulations in figure 4.1. The vertical grey line on the charts indicate the value of the variable under the original shock size and model assumptions. The points on the charts indicate the values under different sensitivity tests, with the horizontal lines highlighting the difference between these values and the values for the original shock. Sensitivity tests with the longest horizontal lines had the largest effect on results.

The sensitivity testing results illustrate that assumptions around some constraints on factors of production tended to have the largest effects on aggregate output variables.

When the **capital stock was fixed**, economic growth was significantly lower because of a lack of capital needed to support production and relatively high capital rental prices. For example, in simulation 1b it was assumed that all production inputs (labour, capital and intermediate inputs) could be used more efficiently across all industries excluding ‘ownership of dwellings’. The assumption of a fixed capital stock led to a real GDP increase of only 1.8% instead of 3.3%. This could be thought of as representing the short-run effects of the shock; that is, the economic impact before the capital stock has had a chance to grow to its steady state level.

Assuming **unemployment and a wage floor** in the economy implies that wages were initially higher and production was lower than would be the case if labour markets cleared. This meant that households

¹² Sensitivity tests in some simulations were not analysed, where it was likely that the model had not solved optimally.

inefficiently spent more time on leisure and consumed less than they would like at the given wages. The simulated shocks tended to increase the market-clearing wage level because they induced growth in the economy. This brought wages closer to (or led them to exceed) the wage floor and led to a reduction in unemployment (to zero for some labour types under some simulations). This also led to a relatively larger increase in production than was seen under original model assumptions. While these results are seen in this stylised model, it is noted that, in reality, unemployment is unlikely to fall to such an extent due to other factors that can affect it, such as structural and frictional factors.

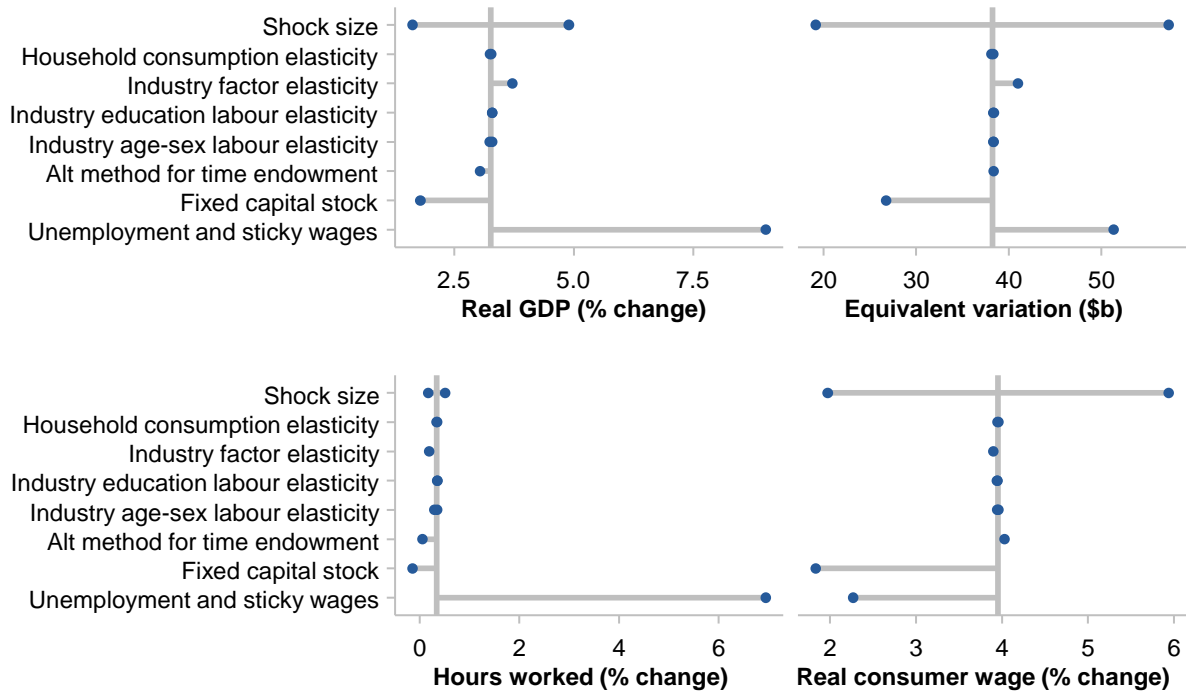
Varying the **shock sizes** also had relatively large effects on the magnitude of changes in key output variables, although the direction of effects tended to be the same as under the original shock size. For example, in simulation 1b, the simulated change in real GDP was about 3.3% under the original assumed shock size of a 1% improvement in input-neutral technical efficiency. The real GDP increase ranged from 1.6 to 4.9% under the respective assumptions of a 0.5% and 1.5% improvement in input-neutral technical efficiency.

The sensitivity tests for the **alternative method of allocating labour and leisure**, and for the assumption of **fixed labour supplies**, tended to have smaller effects on output variables. This is because changes in hours worked in the simulated shocks were relatively small in general under original model assumptions due to various competing effects. On the household side, the effect of higher wages had income and substitution effects that worked in opposite directions (that is, people may want to substitute towards more work and consumption instead of leisure because of the higher wages, but they can also earn the same income by working less and enjoying more leisure instead). On the producer side, most of the industry-specific labour productivity shocks meant that industries required less labour to produce the same amount of output, but subsequent demand effects then increased the amount of labour required.

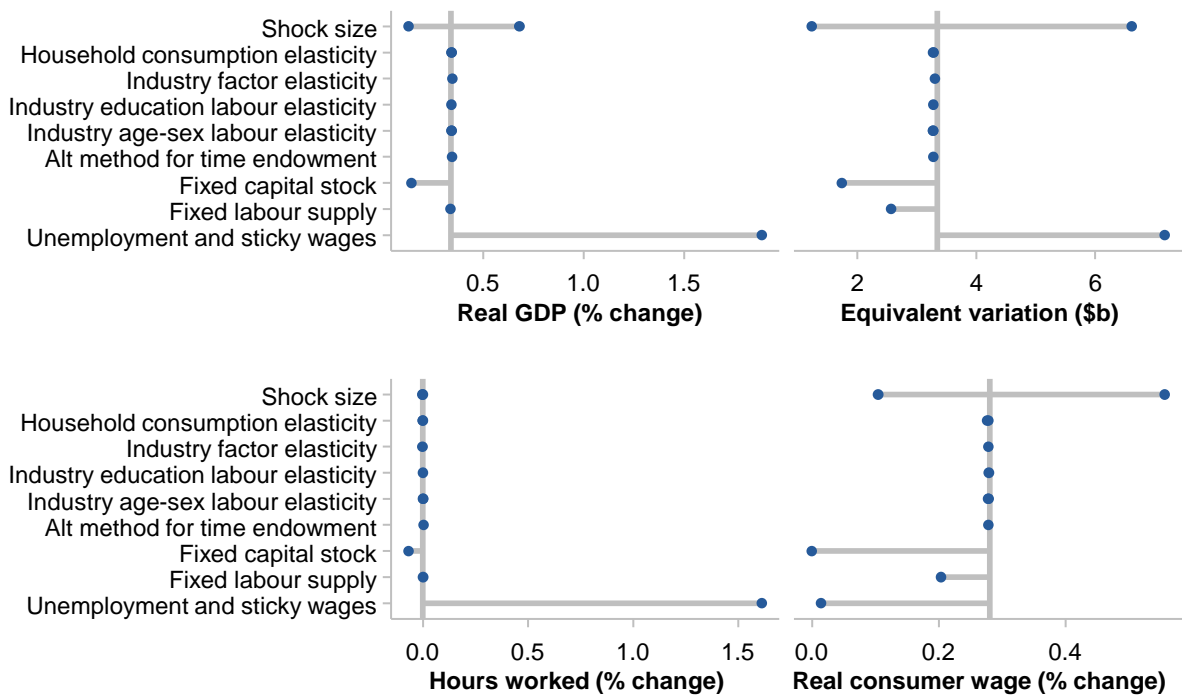
Changes to assumptions around **elasticities** also tended to have smaller effects on aggregate outputs, relative to the other sensitivity tests conducted.

Figure 4.1 – Select sensitivity testing results^a

a. Simulation 1b — potential productivity benefits of diffusion



b. Simulation 6 — reducing unnecessary occupational licensing requirements



a. The vertical grey line indicates the value of the variable under the original shock size and model assumptions. The points indicate the values under different sensitivity tests, with the horizontal lines highlighting the difference between these values and the values for the original shock.

Source: Commission estimates.

5. Model equations

Simple representations of the key equations underlying the model are shown in table 5.1. These complement the high level diagrams showing the model structure in chapter 1. These equations are not in the same form as they have been included in the GAMS code, which were written as mixed complementarity problems with paired equations and variables.

Subscripts refer to various dimensions in the model:

- c — commodities or industries
- e — education level
- l — individual groups of different age group, sex and education level combinations
- s — source of commodity (domestic 'DOM' or imported 'IMP')
- u — user of domestic and imported commodities (industries, household sector 'HH', government sector 'GOV', investment sector 'INV').

Text colour refers to types of variables or parameters:

- black — endogenous variables
- blue — exogenous variables
- green — parameters (select parameters shown only).

When markets clear, demand quantities (denoted by Q^{DEM}) equal supply quantities (Q^{SUP}), and demand prices (purchaser prices, P^{DEM}) equal supply prices (basic prices, P^{SUP}) which are also equal to marginal costs. In some parts of the model, where there are taxes or price floors, demand and supply quantities and prices may not equal (noted in the table below).

Table 5.1 – Simple representations of model equations for key variables

Equation
Individual groups and labour supply in household sector
1. Desired quantity of composite consumption bundle per individual group, via utility maximisation $DesiredCompConsQ_l^{DEM} = CES(DesiredInc_l, GroupCompConsP_l^{DEM}, LabP_l^{SUP})$
2. Desired leisure per individual group, via utility maximisation $DesiredLeisQ_l^{DEM} = CES(DesiredInc_l, GroupCompConsP_l^{DEM}, LabP_l^{SUP})$
3. Labour available per individual group, via utility maximisation $LabAvailable_l = TimeEndow_l - DesiredLeisQ_l^{DEM}$
4. Actual quantity of composite consumption bundle per individual group $GroupCompConsQ_l^{DEM} = CES(Inc_l, GroupCompConsP_l^{DEM}, LabP_l^{SUP})$
5. Actual time not in employment (leisure and unemployed hours) per individual group $GroupNonEmp_l = CES(Inc_l, GroupCompConsP_l^{DEM}, LabP_l^{SUP})$
6. Hours worked per individual group $LabQ_l^{SUP} = TimeEndow_l - GroupNonEmp_l$

Equation

7. Unemployed hours per individual group

$$UnemployedHours_l = LabAvailable_l - LabQ_l^{SUP}$$

8. Minimum hourly wage by individual group

$$LabP_l^{SUP} \geq WageFloor_l$$

9. Income by individual group

$$DesiredInc_l = LabAvailable_l * LabP_l^{SUP} + GroupCapitalInc_l - GroupIncTax_l - GroupSaving_l$$

$$Inc_l = LabQ_l^{SUP} * LabP_l^{SUP} + GroupCapitalInc_l - GroupIncTax_l - GroupSaving_l$$

Demands for domestic and imported commodities, and composites of domestic and imported commodities, across each sector

10. Demand for domestic and imported commodities per user and commodity, to produce composite commodities of domestic and imported commodities, via expenditure minimisation

$$CommodityQ_{u,s,c}^{DEM} = \begin{cases} CES(CompCommQ_{u,c}^{SUP}, CommodityP_{s,c}) & \text{where commodity is substitutable} \\ Leontief(CompCommQ_{u,c}^{SUP}) & \text{where commodity is not substitutable} \end{cases}$$

11. Industry demand for industry composites per industry (c') and commodity (c), via expenditure minimisation

$$CompCommQ_{c',c}^{DEM} = Leontief(\varepsilon_{c'}^{OUTPUT}, IndOutputQ_{c'}^{SUP})$$

Where $\varepsilon_{c'}^{OUTPUT}$ is an input-neutral technical change parameter associated with the use of the industry composite factor of production and industry composite inputs made of domestic and imported commodities.

12. Individual group demand for household composites per individual group and commodity, via expenditure minimisation

$$GroupCompCommQ_{l,c}^{DEM} = CES(GroupCompConsQ_l^{SUP}, CompCommP_{HH,c}^{DEM})$$

$$CompCommQ_{HH,c}^{DEM} = \sum_l GroupCompCommQ_{l,c}^{DEM}$$

13. Government sector demand for government composites per commodity, via expenditure minimisation

$$CompCommQ_{GOV,c}^{DEM} = CobbDouglas(GovQ, CompCommP_{GOV,c}^{DEM})$$

14. Investment sector demand for investment composites per commodity, via expenditure minimisation

$$CompCommQ_{INV,c}^{DEM} = Leontief(InvQ)$$

15. Demand price of composite commodities by user

$$CompCommP_{u,c}^{DEM} = CompCommP_{u,c}^{SUP} (1 + CompCommTaxRate_{u,c})$$

16. Price of imported commodities

$$CommodityP_{IMP,c} = \frac{ImportWorldP_c}{ExchangeRate}$$

Demand for factors of production in production sector

17. Demand for labour hours per industry, via expenditure minimisation

$$IndLabQ_{c,l}^{DEM} = CES(\varepsilon_{c,l}^{LAB}, IndEduclabQ_{c,e}^{SUP}, LabP_l^{DEM})$$

$$Hours_l = \sum_c IndLabQ_{c,l}^{DEM}$$

Where $\varepsilon_{c,l}^{LAB}$ is a labour-augmenting technical change parameter associated with industry use of labour to produce industry-specific 'composite labour by education level'.

18. Demand for industry-specific 'composite labour by education level' per industry, via expenditure minimisation

$$IndEduclabQ_{c,e}^{DEM} = CES(IndCompLabQ_c^{SUP}, IndEduclabP_{c,e}^{DEM})$$

Equation

19. Demand for industry composite labour per industry, via expenditure minimisation

$$IndCompLabQ_c^{DEM} = CES(\alpha_c^{COMPFACOR}, IndCompFactorQ_c^{SUP}, IndCompLabP_c^{DEM})$$

Where $\alpha_c^{COMPFACOR}$ is a multifactor productivity parameter associated with the use of labour and capital to produce the industry composite factor of production (value added).

20. Demand for capital per industry, via expenditure minimisation

$$IndCapQ_c^{DEM} = CES(\alpha_c^{COMPFACOR}, IndCompFactorQ_c^{SUP}, CapP)$$

$$CapQ = \sum_c IndCapQ_c^{DEM}$$

21. Demand for industry composite factor (value added in value terms), via expenditure minimisation

$$IndCompFactorQ_c^{DEM} = Leontief(\varepsilon_c^{OUTPUT}, IndOutputQ_c^{SUP})$$

Where ε_c^{OUTPUT} is an input-neutral technical change parameter associated with the use of the industry composite factor of production and industry composite inputs made of domestic and imported commodities.

Industry output, and production of domestic and exported commodities in production sector

22. Supply price of industry output

$$IndOutputP_c^{SUP} = (1 + ProductionTaxRate_c) * \left(\beta_c^{OUTPUT.COMPFACOR} \frac{IndCompFactorP_c^{DEM}}{\varepsilon_c^{OUTPUT}} + \sum_{c'} \beta_c^{OUTPUT.COMPCOMM} \frac{CompCommP_{c',c}^{DEM}}{\varepsilon_c^{OUTPUT}} \right)$$

Where β_c are Leontief parameters indicating units of input required per unit of output.

23. Supply of domestic and export commodities

$$DomCommodityQ_c^{SUP} = CET(OutputQ_c^{SUP}, CommodityP_{DOM,c}, ExpCommodityP_c^{SUP})$$

$$ExpCommodityQ_c^{SUP} = CET(OutputQ_c^{SUP}, CommodityP_{DOM,c}, ExpCommodityP_c^{SUP})$$

24. Demand for exported commodities

$$ExpCommodityQ_c^{DEM} = \left[\frac{(ExpCommodityP_c^{DEM} * ExchangeRate)}{\alpha_c^{EXP}} \right]^{\sigma_c^{EXP}}$$

Where σ_c^{EXP} is the price elasticity of demand and α_c^{EXP} is a scaling parameter.

25. Demand price of exported commodities

$$ExpCommodityP_c^{DEM} = ExpCommodityP_c^{SUP} (1 + ExpCommodityTaxRate_c)$$

Investment, capital and saving

26. Total investment and capital

$$InvQ = \alpha_{INVQ} CapQ$$

$$CapP = \alpha_{CAPP} InvP$$

Where α_{INVQ} is the fixed ratio of investment to capital quantities, and α_{CAPP} is the fixed ratio of capital to investment prices.

27. Domestic and foreign investment and capital

$$DomesticInvQ = InvQ - ForeignInvQ$$

$$DomesticCapQ = CapQ - ForeignCapQ$$

Equation

28. Saving per individual group

$$HHSavingScaleFactor = \frac{(DomesticInvQ * InvP)}{\sum_l (OrigGroupSavingRate_l * (LabQ_l^{SUP} * LabP_l^{SUP} + GroupCapitalInc_l))}$$

$$GroupSaving_l = HHSavingScaleFactor * OrigGroupSavingRate_l * (LabQ_l^{SUP} * LabP_l^{SUP} + GroupCapitalInc_l)$$

29. Capital per individual group

$$HHCapInvScaleFactor = \frac{(DomesticCapQ * CapP)}{\sum_l (OrigGroupCapInvRatio_l * GroupSaving_l)}$$

$$GroupCapitalInc_l = HHCapInvScaleFactor * OrigGroupCapInvRatio_l * GroupSaving_l$$

Government activity

30. Total government expenditure

$$GovQ * GovP = \alpha_{GOV} NominalGDP$$

Where α_{GOV} is the fixed government share of nominal GDP.

31. Government budget balance

$$GovQ * GovP = HHIncTax + ForeignCapIncTaxRate * ForeignCapQ * CapP$$

$$+ \sum_c \left(ProductionTaxRate_c \frac{IndOutputQ_c^{SUP} * IndOutputP_c^{SUP}}{1 + ProductionTaxRate_c} \right)$$

$$+ \sum_c \sum_u \left(CompCommTaxRate_{u,c} \frac{CompCommQ_{u,c}^{DEM} * CompCommP_{u,c}^{DEM}}{1 + CompCommTaxRate_{u,c}} \right)$$

$$+ \sum_c \left(ExpCommodityTaxRate_c \frac{ExpCommodityQ_c^{DEM} * ExpCommodityP_c^{DEM}}{1 + ExpCommodityTaxRate_c} \right)$$

32. Income tax per individual group

$$HHTaxScaleFactor = \frac{HHIncTax}{\sum_l (OrigGroupTaxRate_l * (LabQ_l^{SUP} * LabP_l^{SUP} + GroupCapitalInc_l))}$$

$$GroupIncTax_l = HHTaxScaleFactor * OrigGroupTaxRate_l * (LabQ_l^{SUP} * LabP_l^{SUP} + GroupCapitalInc_l)$$

Attachment A — Review of 'whole-of-economy modelling'

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I found the modelling appendix is well written and structured. It presents the CGE model developed by the Productivity Commission. The model is purposely built inhouse to suit the needs of the Commission's inquiry. The model is considered as a standard, static, national CGE model with connection to the rest of world through trade, investment and foreign ownership of capital. One feature I would like to highlight is that the model represents Australian households in detail. It includes households by age group, gender and education level. This enables a kind of microsimulation-type modelling to understand different effects of reforms on different household groups, for example, how economic benefits of a productivity reform are distributed across household groups (is the reform leading to improvement of equality or the opposite?). The model also includes endogenous labour supply through labour and leisure choices, which allows understanding of insights on labour supply responses across household groups under a set of stylised productivity reforms simulated in this inquiry.

I found the model is well documented in this appendix. The closure assumptions, nesting structures of each block, databases, parameterisation and calibration are all discussed in detail. Given the representation of multiple household groups in the model, additional sources (such as SIH and HES) of data to input-output tables are used to calibrate the household block. I found the household block is relatively complex but a very useful feature in this model, compared with some of other standard CGE models, since it introduces endogenous labour supply and potential unemployment through wage floor constraint for each household group.

The model is used to run a number of scenarios to gain insights of reforms. Each scenario represents a set of stylised productivity shocks for relevant sectors and/or household groups from hypothetical reforms. Overall, I found the model implementation of the channels of shocks is sensible, and the model results are largely as expected for each scenario, noting the closure assumptions and model parameters used. All results are well interpreted in the appendix.

My specific comments are listed below:

1. I would suggest also to report the model results on gross national income, since it captures foreign income transfers
2. For the aggregation of sectors used, i.e. 17 sectors, some justifications for the choice would be useful
3. For the primary factors in the model, note that land is not a separate factor. This can be considered as a limitation of the model, since land is an important input to Agriculture.
4. In relation with the model closure, suggest adding some reasons for keeping foreign investment fixed, when simulated domestic productivity increases
5. It would be useful to make it clear that an endogenous lump sum transfer to households is used to balance the government budget
6. Determining investment to keep capital stock constant implies the assumption of the capital stock being in a steady state. This has implications on domestic investment and savings required. Whether assuming a trend growth of capital stock would be more appropriate?
7. Model limitations may include: not dynamic and cannot simulate a time path of effects; land is not a separate primary factor (also see comment 3); both capital and labour are assumed perfectly mobile across sectors. If capital is immobile, for example, the gain would be smaller.

8. It would be interesting to know what the implied labour supply elasticity is with the assumed parameter of 0.5 for the ratio of total hours worked to the total time available
9. For the trade elasticities, a reference source could also include the GTAP database
10. For the CET elasticity between export and domestic market, depending on commodities, the number could be even higher. I tend to believe that a larger elasticity implies bigger effects.
11. That costs of implementing reforms are not included in the modelling can be added to the limitations of the modelling
12. The design for scenario 3a) and 3b) could be confusing, particularly in terms of comparison of results, whether 3b) is compared against the normal baseline or the 3a)
13. For scenario 5, the shocks are interpreted as in short-run, long-run and very long-run; while the model closure does not change accordingly – some explanations on the reasoning would be useful
14. For the table on Whole-of-economy outputs, it would be good to include a note that the prices are relative to the fixed numeraire which is CPI
15. In terms of reporting the results across sectors, are there any better metrics to measure the relative impacts between sectors, for example, change in GDP relative to change in the output of the shocked sector
16. Some interpretation of sector-specific impacts could be related to the capital intensity of the affected sector – as the intensity would drive the requirement for capital, given capital is flexible in this modelling
17. The interpretations of the results are mostly on labour. I'd suggest including the effects on capital as well in the interpretations.
18. In the first chart for the sim 2: what would be the reasons for the price drop for other manufacturing, and quantity drop for advanced manufacturing?
19. Interpretation for 3a) and 3b) could be made clearer (also see the comment 12 above).
20. The first chart in sim 5, based on the impacts on price and quantity, the implied price elasticity of demand for school education is greater than -1. Any estimate of this elasticity in the literature? Also, note in the second chart for sim 5 in relation with long run shocks, the implied elasticity for school education is much smaller (or much bigger in absolute value).
21. For sim 6, are the employment falls for older age groups due to the income effect as a result of higher wage?
22. I found the sensitivity test results are useful, which provide a range of possible estimates, depending on parameter values and closure assumptions. The directions of changes with the changes in parameters and closure assumptions are largely as expected with good interpretations provided in the appendix. But it seems there are too many charts. An additional test could include alternative assumption on the foreign investment.

In summary, my specific comments above are mainly related to closure setting, for example, is it appropriate to assume foreign capital stock and investment fixed in all of the productivity sims? In terms of interpretation of results – I was thinking some rules of thumb in understanding the impacts of productivity shocks. For example, the relative impact on GDP would depend on labour shares and GDP shares of a shocked sector. As capital is endogenous, the results would also depend on how much capital is increased. The other point is whether we could draw any guidance to understand the impact on quantity given the impact on price, from the perspective of price elasticity of demand (if there are any estimates of these elasticities in the literature) (i.e. related to the comment 20).

A final point I would like to mention that the modelling presented in the appendix has also taken inputs from the public modelling workshops in which I also participated – these inputs include, for example, the suggested parameter values to use in the modelling and model closure assumptions.

Abbreviations

ABS	Australian Bureau of Statistics
CES	Constant elasticity of substitution
CET	Constant elasticity of transformation
CGE	Computable general equilibrium
CPI	Consumer price index
EV	Equivalent variation
GAMS	General algebraic modelling system
GDP	Gross domestic product
GNI	Gross national income
GTAP	Global Trade Analysis Project
GVA	Gross value added
HES	Household Expenditure Survey
ICT	Information and communication technologies
IO	Input-output
SAM	Social accounting matrix
SIH	Survey of Income and Housing
VET	Vocational education and training

References

- Abrell, J. 2017, *Some Examples of MCP Models*, Center for Energy Policy and Economics, ETH Zurich.
- ABS (Australian Bureau of Statistics) 2007, *Australian Social Trends, 2007*, One-parent families, Cat. no. 4102.0, 7 August..
- 2016a, *Australian Census and Migrants Integrated Dataset 2016*.
- 2016b, *Australian Census of Population and Housing 2016*.
- 2017, *Microdata: Household Expenditure, Income and Housing, 2015-16*, [https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/6540.0Main+Features12015-16](https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/6540.0>Main+Features12015-16) (accessed 30 November 2022).
- 2019a, *Australian Demographic Statistics, Jun 2019*, <https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/3101.0Main+Features1Jun%202019> (accessed 30 November 2022).
- 2019b, *Microdata: Income and Housing, 2017-18*, <https://www.abs.gov.au/statistics/microdata-tablebuilder/available-microdata-tablebuilder/income-and-housing-australia> (accessed 30 November 2022).
- 2021a, *Australian National Accounts: Input-Output Tables, 2018-19*, <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-input-output-tables/2018-19> (accessed 1 December 2022).
- 2021b, *Balance of Payments and International Investment Position, Australia*, September 2021, <https://www.abs.gov.au/statistics/economy/international-trade/balance-payments-and-international-investment-position-australia/zsep-2021> (accessed 31 January 2023).
- 2022a, *Labour Force, Australia, Detailed, June 2022*, <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/jun-2022> (accessed 31 January 2023).
- 2022b, *Schools, Australia 2021*, Cat. no. 4221.0, <https://www.abs.gov.au/statistics/people/education/schools/latest-release> (accessed 30 October 2022).
- Adams, P., Dixon, J. and Horridge, M. 2015, *The Victoria University Regional Model (VURM): Technical Documentation, Version 1.0*, Working Paper, No. G-254, Centre of Policy Studies, Melbourne.
- Agbahey, J., Siddig, K. and Grethe, H. 2020, 'Implications of labor supply specifications in CGE models: A demonstration for employment of Palestinian labor in Israel and its impact on the West Bank economy', *Economic Analysis and Policy*, vol. 68, pp. 265–284.
- Autor, D. 2018, *Lecture Note: The Canonical Model of Skill Differentials*, MIT and NBER.
- Bambalaite, I., Nicoletti, G. and von Rueden, C. 2020, *Occupational Entry Regulations and Their Effects on Productivity in Services: Firm-Level Evidence*, OECD Economics Department Working Papers, 31 March 2020.
- Blankenou, W. and Cassou, S.P. 2011, 'Industry differences in the elasticity of substitution and rate of biased technological change between skilled and unskilled labor', *Applied Economics*, vol. 43, no. 23, pp. 3129–3142.
- Boeters, S. and Savard, L. 2013, 'Chapter 26 - The labour market in computable general equilibrium models', *Handbook of Computable General Equilibrium Modeling*, vol 1, Elsevier, pp. 1645–1718.
- Braga, M., Paccagnella, M. and Pellizzari, M. 2016, 'The impact of college teaching on students' academic and labor market outcomes', *Journal of Labor Economics*, vol. 34, no. 3, pp. 781–822.
- Bullen, J., Conigrave, B., Elderfield, A., Karmel, C., Lucas, L., Murphy, C., Ruberl, H., Stoney, N. and Yao, H. 2021, *The Treasury Macroeconometric Model of Australia: Modelling Approach*, Treasury Paper, Australian Treasury.
- Cardona, M., Kretschmer, T. and Strobel, T. 2013, 'ICT and productivity: conclusions from the empirical literature', *Information Economics and Policy*, vol. 25, pp. 109–125.
- Cheong, D. and Sonnenschein, X. 2012, *Trade Liberalisation and Employment in Indonesia: A CGE Analysis*, Conference Paper, 15th Annual Conference on Global Economic Analysis, Geneva, Switzerland.
- Chetty, R., Friedman, J.N., Hilger, N., Saez, E., Whitmore Schanzenbach, D. and Yagan, D. 2011, 'How does your kindergarten classroom affect your earnings? Evidence from Project Star', *Quarterly Journal of Economics*, vol. 126, no. 4, pp. 1593–1660.
- Clements, K., Mariano, M.J. and Verikios, G. 2020, *Foreign-Domestic Substitution, Import Penetration and CGE Modelling*, Griffith Business School Discussion Paper Series - Economics and business statistics.
- Currie, J. and Thomas, D. 2001, 'Early test scores, school quality and SES: Longrun effects on wage and employment outcomes', *Worker Wellbeing in a Changing Labor Market (Research in Labor Economics)*, vol 20, Emerald Group Publishing Limited, Bingley, pp. 103–132.
- Dandie, S. and Mercante, J. 2007, *Australian Labour Supply Elasticities: Comparison and Critical Review*, Treasury Working Paper, 2007–04, Australian Treasury.
- De Giorgi, G., Paccagnella, M. and Pellizzari, M. 2013, *Gender Complementarities in the Labor Market*, Occasional Paper, 183, Bank of Italy.
- Delahaye, E.E. and Milot, C.A. 2020, *Measuring the UK Economy's Armington Elasticities*, Conference Paper, 23rd Annual Conference on Global Economic Analysis, Global Trade Analysis Project.
- DIIS and IP Australia (Department of Industry, Innovation and Science and IP Australia) 2017, *A Patent Analytics Study on the Australian Advanced Manufacturing Industry*.
- Dixon, J. and Nassios, J. 2019, *Evaluating Gender Impacts in Employment: A CGE Framework for Policy Makers*, Conference Paper, 22nd Annual Conference on Global Economic Analysis.
- Fox, A. 2002, *Incorporating Labor-Leisure Choice into a Static General Equilibrium Model*, Conference Paper, 5th Annual Conference on Global Economic Analysis.

- Gechert, S., Havranek, T., Irsova, Z. and Kolcunova, D. 2019, *Death to the Cobb-Douglas Production Function*, Working Paper, 26/2019, Institute of Economic Studies.
- Gharibnavaz, M.R. and Verikios, G. 2018, *Estimating LES Parameters with Heterogeneous Households for a CGE Model*, Conference Paper, 21st Annual Conference on Global Economic Analysis.
- Ghosh, P.K. 2018, *A Study of the Long-run Substitutability Between Men and Women*, Conference Paper, IZA Conference Mimeo.
- Giesecke, J.A., King, C., Nassios, J. and Tran, N.H. 2021, 'The impact of GST reform on Australia's state and territory economies', *Applied Economics*, vol. 53, no. 51, pp. 5929–5947.
- Go, D.S. 1994, 'External shocks, adjustment policies and investment in a developing economy: Illustrations from a forward-looking CGE model of the Philippines', *Journal of Development Economics*, vol. 44, no. 2, pp. 229–261.
- Guisinger, A.Y. 2020, 'Gender differences in the volatility of work hours and labor demand', *Journal of Macroeconomics*, vol. 66, no. 103254.
- Havranek, T., Irsova, Z., Laslopova, L. and Zeynalova, O. 2020, *The Elasticity of Substitution Between Skilled and Unskilled Labor: A Meta-analysis*, Munich Personal RePEc Archive, 102598.
- Hertel, T.W. and van der Mensbrugge, D. 2019, 'Chapter 14 Behavioral Parameters', *Center for Global Trade Analysis*.
- Hinson, M., Wende, S. and Womack, P. 2020, *Modelling Industry-Specific Policy Using Treasury's Industry Model (TIM): A Dynamic General Equilibrium Model of the Australian Economy*, Conference Paper, 23rd Annual Conference on Global Economic Analysis.
- Hosoe, N., Gasawa, K. and Hashimoto, H. 2010, *Textbook of Computable General Equilibrium Modelling: Programming and Simulations*, Palgrave Macmillan, United Kingdom.
- Hunter, J., Haywood, A. and Parkinson, N. 2022, *Ending the Lesson Lottery: How to Improve Curriculum Planning in Schools*, Grattan Institute.
- Independent Economics 2015, *Australia's Comparative Advantage: Economic Scenarios*, Prepared for the Australian Council of Learned Academies (ACOLA), May.
- Jerzmanowski, M. and Tamura, R. 2020, *Aggregate Elasticity of Substitution Between Skills: Estimates from a Macroeconomic Approach*, Munich Personal RePEc Archive, 100768.
- Kopecna, V., Scasny, M. and Recka, L. 2020, *Estimating the Elasticity of Substitution in CES Production Function: Examining Different Nesting Structures and EU Regions*, Working Paper, 43/2020, Institute of Economic Studies.
- KPMG Econtech 2010, *CGE Analysis of the Current Australian Tax System*, Report prepared for Commonwealth Treasury, Final Report.
- Lavy, V. 2015, 'Do differences in schools' instruction time explain international achievement gaps? Evidence from developed and developing countries', *The Economic Journal*, vol. 125, no. 588, pp. F397–F424.
- Merette, M. 2007, *Substitution Between Young and Old Workers in an Ageing Context*, Conference Paper, International Conference on Policy Modeling, Sao Paulo, Brazil.
- Murphy, C. 2018, *Modelling Australian Corporate Tax Reforms: Updated for the Recent US Corporate Tax Changes*, Working Paper, 2/2018, Tax and Transfer Policy Institute.
- Murphy, F., Pierru, A. and Smeers, Y. 2016, 'A tutorial on building policy models as mixed-complementarity problems', *INFORMS Journal on Applied Analytics*, vol. 46, no. 6, pp. 465–481.
- NSC (National Skills Commission) 2022, *Employment Projections*, <https://labourmarketinsights.gov.au/our-research/employment-projections/> (accessed 23 May 2022).
- PC (Productivity Commission) 2022, *The nuisance cost of tariffs*, Research paper, Canberra.
- 2023, *Review of the National Schools Reform Agreement*, Study Report, Canberra.
- Qi, H. 2014, 'Real wages and labor supply in a quasi life-cycle framework: a macro compression by Swedish National Transfer Accounts (1985–2003)', *Vienna Yearbook of Population Research*, vol. 12, pp. 83–114.
- Rose, H. 2006, 'Do gains in test scores explain labor market outcomes?', *Economics of Education Review*, vol. 25, no. 4, pp. 430–446.
- Sanchez, C., M.V. 2004, 'Chapter 7: calibration, solution and validation of the CGE model', *Rising inequality and falling poverty in Costa Rica's agriculture during trade reform: a macro-micro general equilibrium analysis*, Shaker, Maastricht, pp. 189–226 and related appendices.
- Turnovsky, S.J. 2002, 'Intertemporal and intratemporal substitution, and the speed of convergence in the neoclassical growth model', *Journal of Economic Dynamics & Control*, vol. 26, pp. 1765–1785.
- Verikios, G., Hanslow, K., Mariano, M.J.M. and Clements, K. 2021, *Understanding the Australian Economy: a Computable General Equilibrium Model with Updated Data and Parameters*, Discussion Paper, Griffith Business School.
- Vu, T.M. and Yamada, H. 2022, 'Returns in wage and employment from test scores: evidence from Vietnamese National University entrance exams 2009 and household data 2018–2020', Routledge, *Applied Economics Letters*, pp. 1–4.
- Warr, P.G. and Lapidis, E.A. 1994, *Estimation of Elasticities of Substitution/Transformation Between Domestic and Imported/Exported Commodities*, The PARA General Equilibrium Model of the Thai Economy.
- Watts, T.W. 2020, 'Academic achievement and economic attainment: reexamining associations between test scores and long-run earnings', *AERA Open*, vol. 6, no. 2, pp. 1–16.
- Wedel, K. 2021, 'Instruction time and student achievement: The moderating role of teacher qualifications', *Economics of Education Review*, vol. 85, no. 102183.