

Overview: Understanding productivity in Australia and the global slowdown

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Productivity growth is a key driver of living standards, but it has slowed since the mid-2000s in Australia. The slowdown in productivity growth is consistent with the experience in most other advanced economies, suggesting that global factors are contributing. As in other countries, declining economic dynamism and competition has weighed on firms' incentives to adopt technologies, and for resources to flow to more productive firms. Research and development have lagged other countries somewhat, though broader innovation metrics have improved moderately. Domestic policy can have significant impacts by facilitating innovation, diffusion of technologies, and better resource reallocation to move Australia closer to the global frontier.

Productivity growth has slowed

Productivity growth has slowed in Australia since the mid-2000s (Figure 1, PC 2017). Nationally, productivity growth averaged 1.6 per cent over the past 30 years, but only 1.2 per cent over the past 20 years. A similar slowdown is visible in the market sector.¹

Labour productivity growth can be decomposed into 2 components: capital deepening and multifactor productivity (MFP) growth.² The weakening in productivity growth mostly reflects a decline in MFP growth, which slowed to 0.2 per cent in the market sector over the last 2 complete productivity cycles (2004-2018), compared to 1.7 per cent over the previous 2 productivity cycles (1989-2004) (Figure 2). Capital deepening has also slowed in the most recent years.³

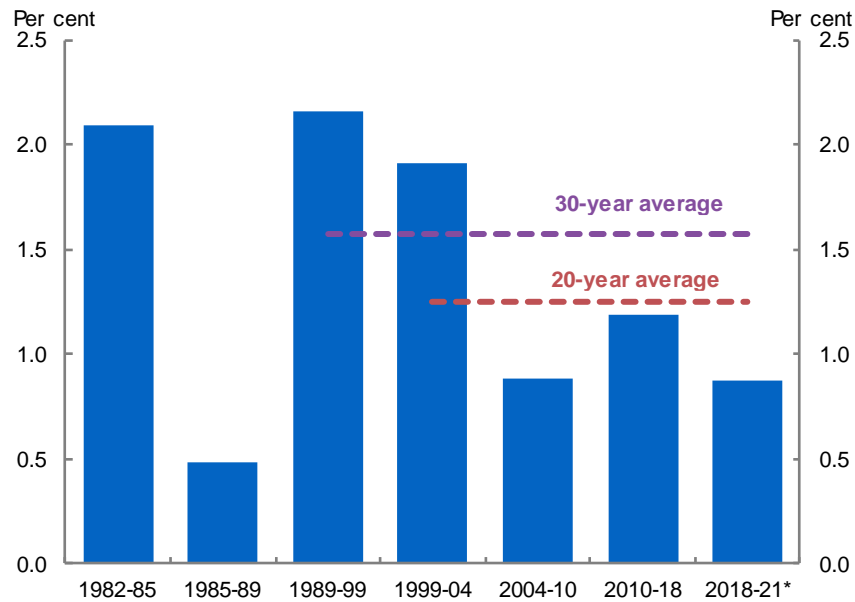
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¹ The market sector excludes industries such as Public Administration and Safety, Health, and Education.

² Capital deepening occurs when there is more capital for each worker and MFP growth occurs when labour and capital are used more efficiently.

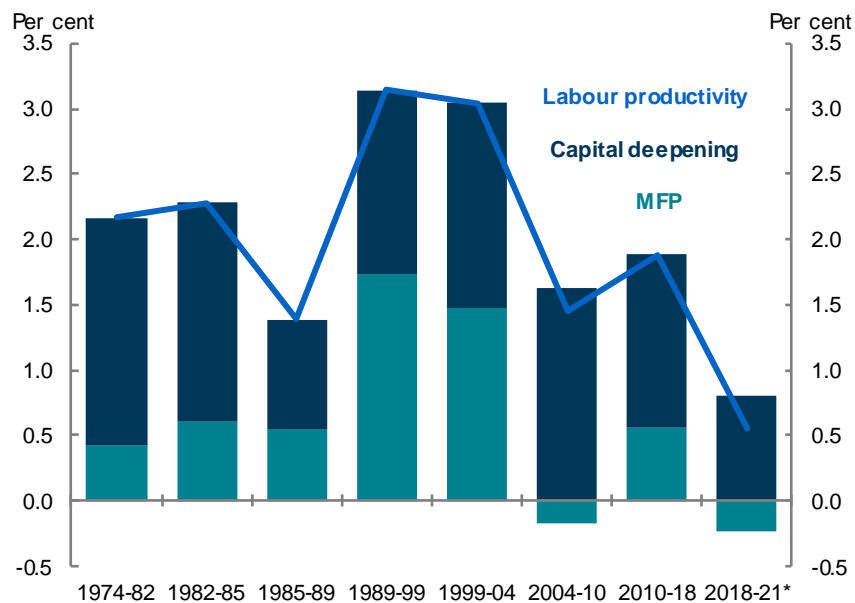
³ MFP growth is likely to have been understated, and capital deepening overstated, in the investment phase of the mining boom in the late 2000s before production ramped up. The reverse is true as output ramped up over the early 2010s.

Figure 1: Whole economy labour productivity growth



Notes: Productivity cycles determined by the ABS. Final cycle (2018-21*) is incomplete.
Source: ABS Australian System of National Accounts, 2020-21.

Figure 2: Market sector labour productivity growth decomposition



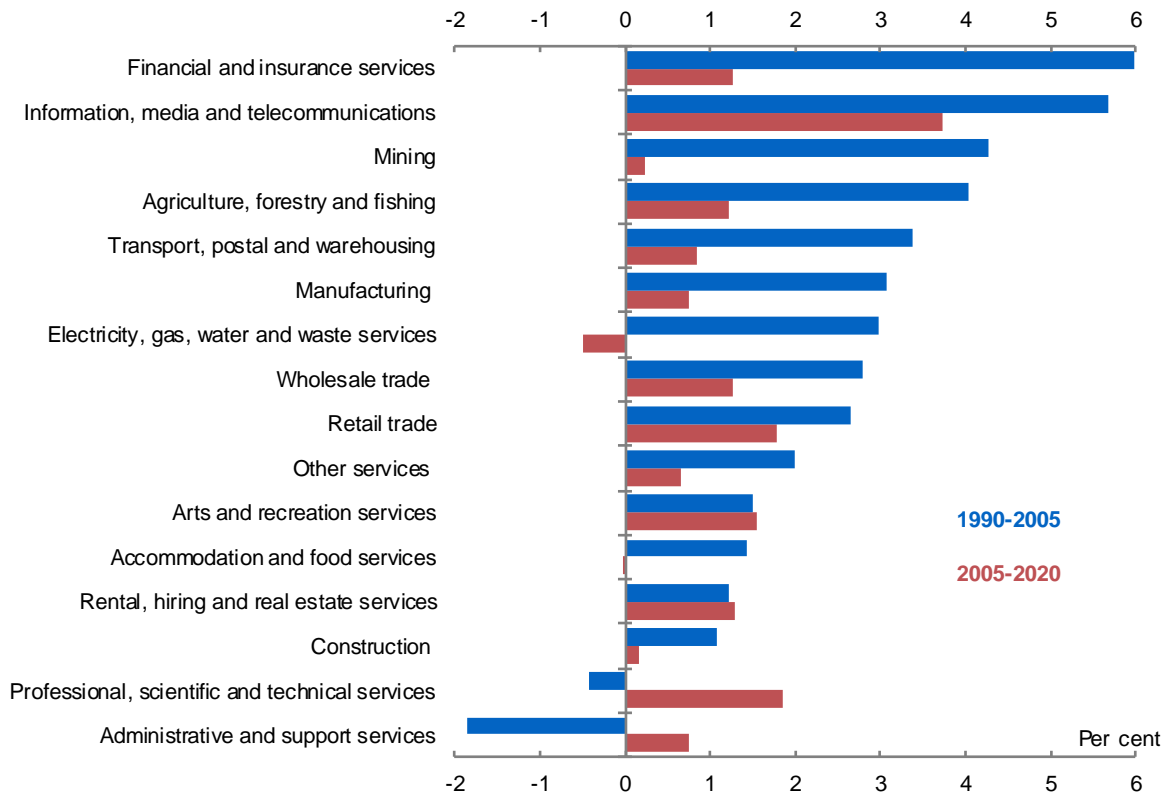
Notes: Productivity cycles determined by the ABS. Final cycle (2018-21*) is incomplete. Market sector labour productivity measured by GVA per hour in 12 selected industries.
Source: ABS Estimates of Industry Multifactor Productivity, 2020-21.

The shift towards the services sector does not account for the slowdown in productivity growth (Campbell and Withers 2017), with declines in productivity growth observed across most industries (Figure 3).

The overall productivity slowdown is broadly consistent with the experiences of other advanced economies. For instance, labour productivity growth in the United States was 1.1 per cent on average over the past 10 years, compared to 1.6 per cent over the past 20 years (Feenstra et al. 2015). The

broad-based decline in productivity across advanced economies suggests that global factors at least partly explain the decline in productivity growth in Australia.

Figure 3: Average annual labour productivity growth, by industry



Notes: Growth rates determined by compound average growth.
 Source: ABS Estimates of Industry Multifactor Productivity, 2020-21.

What explains the global slowdown?

Many factors have likely contributed to slower global productivity growth, and we explore some of the key discussions below.

Are current innovations transformative?

Techno-pessimists argue that past innovations were far more significant than current innovations. For example, electrification completely re-shaped the way we lived, while we have also potentially reaped most of the gains from the information technology expansion era of the 1990s and early 2000s (Gordon 2012).

Techno-optimists argue that current innovations – such as artificial intelligence (AI) – can be just as transformative, but that many of the benefits will take time to accrue. This is because these ‘general-purpose technologies’ require complementary investments and skills to fully realise the benefits (Brynjolfsson and McAfee 2011).

While the debate between the 2 camps is ongoing, continued strong productivity growth among ‘frontier’ firms suggests current technologies are transformative, but may be slower to diffuse to other firms (Andrews, Criscuolo, and Gal 2019).

Have we become worse at measuring productivity over time?

A related explanation is that we may have become worse at measuring inputs and outputs over time. Accounting for improvements in the quality of goods and services is challenging. This may have become even harder with the advent of new and digital technologies, as well as free services and platforms (for example, Google and Facebook). Similarly, measuring investments in intangibles such as ideas, processes, and brands can be difficult.⁴ Some economists argue that these challenges mean productivity growth is underestimated.

However, research has found that while measurement errors exist, they are unlikely to explain a large share of the decline in labour productivity (Boppart and Li 2021, Burnell and Elnasri 2020).

Is the slowdown in trade a factor?

Increased trade and use of global value chains (GVCs) contributed to productivity growth over the 1990s and early 2000s by enabling cheaper production, specialisation, increasing competition and diffusing technologies and knowledge. However, many of these gains may have already been reaped. Growth in trade also slowed after the global financial crisis reflecting a shift away from import-intensive goods, slowdown in growth in Asian economies and heightened economic uncertainty (Jääskelä and Mathews 2015). Recent studies suggest that diminishing gains from trade could account for a moderate portion of the global productivity slowdown – Goldin et al. (2021) suggest it could account for around 15 per cent of the slowdown.

Is the economy less dynamic and competitive?

Resources, ideas, and technologies flow easily between firms in a dynamic economy. New firms enter and either thrive and grow, or exit. This allows resources to flow to their most productive use, and creates competitive pressures that cause firms to innovate, invest and improve.

However, measures of dynamism have been declining in the United States and other advanced economies (Calvino, Criscuolo and Verlhac 2020). Fewer firms are opening and closing. Job reallocation has slowed. Young firms now make up a smaller share of economic activity. Meanwhile, measures of competitive pressures have declined. Firms appear to be slower to adopt new technologies and converge to the productivity frontier (Akcigit and Ates 2019). Declining dynamism appears to be an important contributor to slower productivity growth.

Is human capital playing a role?

Human capital is an important driver of productivity since skilled workers can perform tasks and produce output more efficiently. Improvements in human capital have been estimated to boost productivity (Égert and Turner 2022) and differences in human capital can drive differences in productivity at the firm level (Criscuolo et al. 2021). A slowdown in the growth of human capital may

⁴ The challenges of measuring productivity in the service sector are outlined in Productivity Commission (2021).

have impacted the productivity slowdown in some countries such as the US (Vollrath 2019). To date, there is limited evidence of this in Australia, particularly given that quality-adjusted measures of labour productivity in Australia have followed similar trends to unadjusted labour productivity.

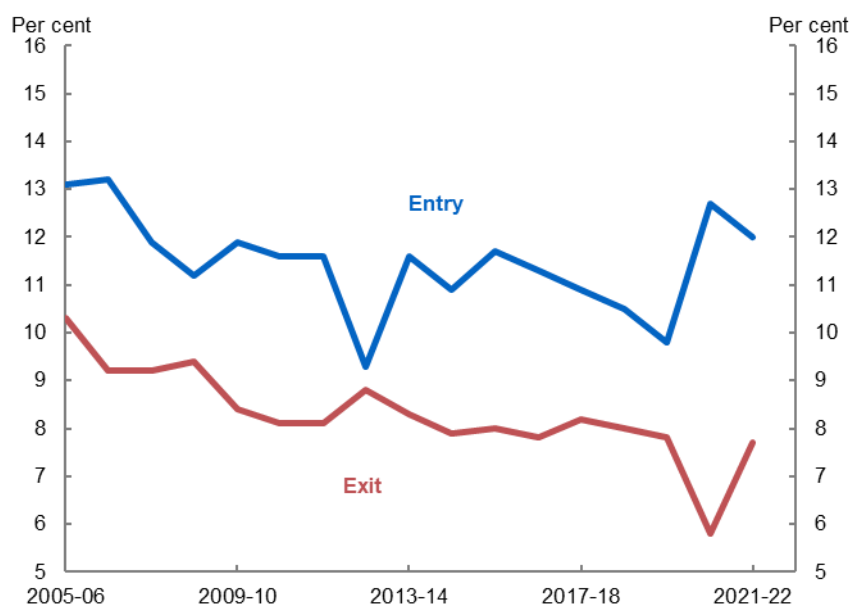
What evidence is there for Australia?

Much of the recent evidence for Australia has focused on declining dynamism, competitive pressures, and innovation.

The economy is less dynamic

As in other countries, business dynamism has declined in Australia. Entry and exit rates have fallen (Figure 4), and the share of economic activity done by young firms, which often drive innovation, has fallen. People have become less likely to switch jobs, with the lack of new firms appearing to be an important factor (Deutscher 2019; Andrews and Hansell 2021).

Figure 4: Entry and exit rates



Notes: Entry and exit rates are for employing firms. Entry and exit rates during the pandemic period may have been affected by temporary government support and changes in insolvency laws.

Source: Treasury analysis of ABS Counts of Australian Businesses, including Entries and Exits.

Competitive pressures have declined

Measures of competitive pressures have also declined in Australia since the mid-2000s. On average industries have become more concentrated, while mark-ups have also increased. At the same time, the largest firms in each industry have become more entrenched. Declines in competitive pressures appear smaller than those documented overseas. However, they still appear to have weighed on productivity, lowering business incentives to innovate and reallocate resources to more productive uses (see Day, Duretto, Hambur and Hartigan, this edition).

Resources are slower to be allocated to productive firms

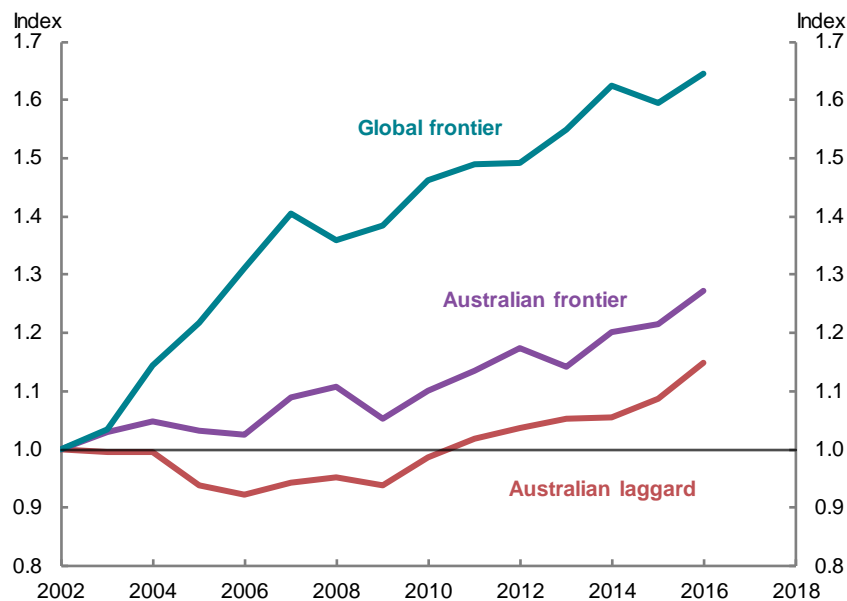
Historically, Australia was good at allocating resources to the most productive use, comparing favourably with the United States on measures of allocative efficiency, particularly in manufacturing.

However, labour now flows to more productive firms more slowly. Estimates suggest this accounts for around one-quarter of the slowdown in productivity growth. The slowing in reallocation was worse in industries where competitive pressures declined (Andrews and Hansell 2021, Hambur 2021).

Adoption of new technology is slower and Australian firms are falling further behind the global frontier

Australian businesses are falling further behind the global frontier (Figure 5), and the rate at which they catch up has slowed. This suggests they are slower to adopt new cutting-edge technologies and processes (Bahar and Lane, this edition). This finding is consistent with evidence overseas. Diffusion of many new technologies is also far from complete (Treasury 2019).

Figure 5: Labour productivity dispersion – business sector



Notes: Frontier is top 5 per cent of firms in an industry. Business sector is defined here as the manufacturing sector plus the services sector. Indexed to 2002=1, so that the vertical axis shows cumulative productivity growth.

Source: Andrews et al. (2022).

The slowdown was larger in sectors with declining entry and exit rates, and where measures of competitive pressures had declined. This suggests that declining dynamism and competitive pressures have lowered the impetus for firms to adopt new technologies and improve their productivity (Andrews et al. 2022).

Innovative activity continues to grow slowly, while research and development (R&D) lags global peers

Business R&D (BERD) is an important input into innovation and, therefore, productivity. As a share of GDP, Australia's BERD declined from 1.3 per cent in 2009–10 to 0.9 per cent in 2019–20 (DISER 2021). In contrast, BERD as a percentage of GDP has increased slightly for OECD economies, going from 1.5 per cent in 2010 to 1.9 per cent in 2020.⁵

While this result is important, the extent of Australia's underperformance may be slightly overstated. Much of the decline reflects a decrease in mining exploration following the end of the resources boom. After excluding the mining sector, the decline in BERD as a percentage of GDP is much smaller, and some industries such as professional, scientific and technical services have seen increases (from 3.0 per cent in 2009–10 to 4.5 per cent in 2019–20).⁶

Other measures of innovation have also been more favourable. The share of human resources devoted to R&D increased slightly between 2005–06 to 2019–20, from 0.41 per cent of the labour force to 0.57 per cent.⁷ Broader measures of innovation have also improved moderately over this time; for example, the share of firms actively innovating has steadily risen from 42.4 per cent in 2005–06 to 50.7 per cent in 2019–20 (DISER 2021).

Fiscal impacts of slowing productivity growth

If Australia was closer to the global frontier of productivity growth, this would lead to permanent increases in income levels and higher living standards. Australia is limited in the extent to which it can grow more rapidly than comparable countries, however, it is likely we are not near that limit.

There are fiscal implications if the slowing of productivity over the past 2 decades persists. Modelling from the Intergenerational Report 2021 suggests that if productivity growth averaged 1.2 per cent over the medium term rather than 1.5 per cent, real GDP growth would be lower and real gross national income per person would be around \$13,000 smaller by 2060. Additionally, the underlying cash balance as a percentage of GDP would be around 2.2 percentage points lower.

Policy can support productivity growth

Policy can play a crucial role in addressing the productivity slowdown. Slower global productivity growth will weigh on Australia's productivity growth, especially as a small open economy that tends to adopt innovations from the frontier. However, domestic policy can still have significant impacts on productivity growth. Policies that could support Australia to move closer to the global productivity frontier include: incentivising and facilitating the innovation and diffusion of technologies; supporting firm growth and innovations of higher novelty (new-to-world, new-to-country); and removing

⁵ OECD data on BERD as a percentage of GDP <https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB#>.

⁶ Treasury calculations using ABS Research and Experimental Development, Businesses 2019-20, and Australian Industry 2020-21.

⁷ Human resources devoted to R&D is measured using person years effort (PYE) and labour force is measured using the number of persons. One PYE is equal to a full-time employee devoted to R&D for a whole year. Treasury calculations using ABS Research and Experimental Development, Businesses, and Labour Force data.

barriers to resource reallocation and formation of trade linkages (particularly global value chains) (Athukorala et al. 2017).

This is evident overseas. OECD research has shown that declines in dynamism were larger when there were higher regulatory barriers, less efficient bankruptcy rules, and lower levels of education and skills (Calvino, Criscuolo and Verlhac 2020). Good policy can partly offset the global factors weighing down dynamism. Previous reform eras of the 1980s and 1990s were followed by periods of strong productivity growth, bringing Australia closer to United States levels (Figure 6).

Figure 6: Ratio of Australian to US labour productivity



Notes: GDP per hour worked in Australia divided by GDP per hour worked in the US (output-side GDP at chained PPPs in 2017 USD).
Source: Feenstra et al. 2015 (Penn World Table)

While some of the larger reforms of the 1980s and 1990s have been realised, there are still many important reforms that can be undertaken. The Productivity Commission has commenced its second 5-yearly review to identify this next round of productivity-enhancing reforms.

While there is evidence Australia avoided a shakeout of highly productive firms during the COVID-19 lockdowns, it is too early to ascertain the productivity impacts of COVID-19 (Andrews, Bahar and Hambur 2021). There is evidence that, globally, COVID-19 has sped up the process of digital adoption and policy can potentially help facilitate this. However, disruptions to schooling may have negative implications for human capital, while global shifts towards domestic production undo some of the productivity gains provided by global value chains.

References

- Akcigit U and Ates S (2019) 'Ten Facts on Declining Business Dynamism and Lessons from Endogenous Growth Theory', *NBER working paper* 25755.
- Andrews D, Criscuolo C and Gal PN (2019) 'The Best Versus the Rest: Divergence across Firms during the Global Productivity Slowdown', *CEP Discussion Paper* 1645.
- Andrews D, Bahar E and Hambur J (2021) 'The COVID-19 shock and productivity-enhancing reallocation in Australia: Real-time evidence from Single Touch Payroll', *OECD Economics Department Working Papers*.
- Andrews D, Hambur J, Hansell D and Wheeler A (2022) 'Reaching for the Stars: Australian Firms and the Global Productivity Frontier', *Treasury Working Paper*.
- Andrews D and Hansell D (2021) 'Productivity-Enhancing Labour Reallocation in Australia', *Economic Record*, 97(317): 157-169.
- Athukorala PC, Talgaswatta T and Majeed O (2017) 'Global production sharing: Exploring Australia's competitive edge', *The World Economy*, 40(10): 2172-2192.
- Australian Bureau of Statistics (2020–21 financial year a) 'Tables 1 to 19: Estimates of industry multifactor productivity' [time series spreadsheet], [Estimates of Industry Multifactor Productivity](#), accessed 17 December 2021.
- Australian Bureau of Statistics (2020–21 financial year b) 'Australian industry by division' [time series spreadsheet], [Australian Industry](#), accessed 14 January 2022.
- Australian Bureau of Statistics (2019–20 financial year) 'Business expenditure on R&D, by ANZSIC06 industry subdivision, by employment size' [data cube], [Research and Experimental Development, Businesses, Australia](#), accessed 14 January 2022.
- Australian Bureau of Statistics (July 2017 – June 2021) 'Data cube 1: Tables 1-20 of counts of Australian businesses, including entries and exits' [data set], [Counts of Australian Businesses, including Entries and Exits](#), accessed 21 July 2022.
- Boppart T and Li H (2021) 'Productivity Slowdown: Reducing the Measure of Our Ignorance', *Federal Reserve Bank of San Francisco working paper*.
- Burnell DS and Elnasri A (2020) 'Does Measurement of Digital Activities Explain Productivity Slowdown? The Case for Australia', *Economie et Statistique / Economics and Statistics*, 517-518-519: 123–137.
- Brynjolfsson E and McAfee A (2011) 'Race Against The Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy', *Digital Frontier Press*.
- Calvino F, Criscuolo C and Verlhac R (2020) 'Declining business dynamism: structural and policy determinants', *OECD Science, Technology and Innovation Policy Papers*, 94.

Campbell S and Withers H (2017) 'Australian productivity trends and the effect of structural change', *Department of the Treasury*, <<https://treasury.gov.au/publication/p2017-t213722c>>.

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*, 29, OECD Publishing, Paris.

DISER (Department of Industry, Science, Energy and Resources) (2021) 'Australian Innovation System Monitor', Australian Government, viewed 25 October 2021 <www.industry.gov.au/aismonitor>.

Department of the Treasury (2021) '2021 Intergenerational Report', Australian Government, viewed 22 October 2021, <<https://treasury.gov.au/publication/2021-intergenerational-report>>.

Department of the Treasury (20 June 2019) *Keeping pace with technological change: the role of capabilities and dynamism* [media release], Department of the Treasury, accessed 10 July 2022.

Deutscher N (2019) 'Job-to-Job transitions and the wages of Australian workers', *Treasury Working Paper*.

Égert B and Turner D (2022) 'A new macroeconomic measure of human capital exploiting PISA and PIAAC: Linking education policies to productivity', *OECD Economics Department Working Papers*, 1709, OECD Publishing, Paris.

Feenstra RC, Inklaar R and Timmer MP (2015) 'The Next Generation of the Penn World Table' *American Economic Review*, 105(10): 3150-3182, available for download at <www.ggd.net/pwt>.

Goldin I, Koutroumpis P, Lafond F and Winkler J (2021) 'Why is productivity slowing down?', *Oxford Martin Working Paper Series on Economic and Technological Change*.

Gordon RJ (2012) 'Is US Economic Growth Over? Faltering Innovation Confronts Six Headwinds', *NBER Working Paper* 18315.

Hambur J (2021) 'Product Market Power and its Implications for the Australian Economy', *Treasury working paper*.

Jääskelä J and Mathews T (2015) 'Explaining the slowdown in global trade', *Reserve Bank of Australia Bulletin*, September, 39-46.

PC (Productivity Commission) (2017) 'Shifting the Dial: 5-year productivity review', Australian Government, viewed 3 November 2021, <<https://www.pc.gov.au/inquiries/completed/productivity-review/report>>.

PC (Productivity Commission) (2021) 'Things you can't drop on your feet: An overview of Australia's services sector productivity', Australian Government, PC Productivity Insights, viewed 29 November 2021, <<https://www.pc.gov.au/research/ongoing/productivity-insights/services>>.

Vollrath D (2019) *Fully Grown: Why a Stagnant Economy Is a Sign of Success*, University of Chicago Press, Chicago and London.