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Global trade and investment megatrends

Exploring opportunities and risks for the Australian economy during and after the COVID-19 crisis with strategic foresight

Citation

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Note

All values in this report are in Australian dollars (AUD) unless otherwise specified.

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FAST FACTS

Trade and investment during the pandemic

Data sources: Fact 1: International Monetary Fund [1]. Facts 2 and 3: United Nations Conference on Trade and Development [2, 3]. Fact 4: Australian Bureau of Statistics [4]. Fact 5: Australian Bureau of Statistics [5]; United Nations World Tourism Organization [6]. Fact 6: Department of Foreign Affairs and Trade, Australian Government [7]; The University of Melbourne [8]. Fact 7: United Nations [9]. Fact 8: Department of Agriculture, Water and the Environment, Australian Government [10]. Fact 9: LinkedIn Pulse [11]. Fact 10: United Nations Conference on Trade and Development [12].

1 **The world economy** is forecast to contract by 4.4% this year and grow by 5.2% next year.

2 **Global foreign direct investment** is forecast to drop by 40% to under $1 trillion (2005 levels) this year with further drops of 5–10% next year.

3 **Global merchandise trade** has contracted by 14.3% in the second quarter of 2020.

4 **Today, exports comprise 22% of Australia's GDP** up from 7% in the 1960s. Exports will be an important way of escaping the COVID-19 economic slump.

5 Australians spent $58.3 billion in 2018–19 visiting other countries, while visitors spent $39.1 billion in Australia. **Global tourism** contracted by 57% in March 2020. Future tourists want safe holidays.

6 **Overseas education** is our fourth-largest export – earning $37.6 billion/year. It is estimated that COVID-19 will cause losses of $18 billion by 2024. Universities are finding ways to rebuild the sector.

7 **On R&D,** the world spent US$2.19 trillion in 2019, up from US$1.75 trillion in 2013 with a big increase after the 2008–09 GFC. Signs of renewed R&D spending are emerging with Singapore, UK, USA and New Zealand announcing large R&D stimulus packages.

8 **Food and agricultural exports** from Australia to our eight largest markets in Asia increased 86% to $33 billion/year over the 20 years to 2019. Demand in Asia is expected to double by the year 2050.

9 **Telework, telehealth, online retail, online education and digital services** exploded during COVID-19. According to LinkedIn data, the Australian information technology sector saw a 17.3% year-on-year increase in jobs recruitment during COVID-19 in March.

10 **Digitally enabled service exports** from Australia amounted to $23 billion in 2018, up from $17 billion a decade ago.

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Executive summary

Informing trade and investment strategy for economic recovery – the purpose of this report

The purpose of this report is to help secure Australia's future and catalyse new trade and investment by identifying global megatrends emerging in the post-COVID-19 world.

This report presents the results of a CSIRO and Australian Trade and Investment Commission (Austrade) strategic foresight study exploring changes in the global trade and investment landscape likely to occur over the coming months and years.

The report also presents a set of strategic actions for Australian governments and industries to capitalise on significant shifts in the global trade and investment landscape.

Trade and investment strategies responding to the new normal of the mid/post-COVID-19 world will boost jobs and growth plus speed up Australia's economic recovery.

A transformed trade and investment landscape

Due to COVID-19, world merchandise trade fell by 14.3% in the second quarter of 2020 - the largest decline ever recorded [3]. Total volume of world merchandise trade is forecast to fall by 9.2% in 2020 [13]. Global foreign direct investment is forecast to decrease by 40% from $1.54 trillion in 2019 to under $1 trillion, which is lower than 2005 levels. Further drops of 5–10% are forecast for 2021 with a rebound expected for 2022 [2]. These conditions are associated with a forecast –4.4% contraction of the global economy this year [1].

However, there are signs of recovery. The International Monetary Fund forecasts global growth of 5.2% in 2021 [1]. The World Trade Organization [13] observed that since May, air cargo transport has been rising along with a rise in new export orders. Shipping container port throughput has also shown signs of a partial recovery and automobile sales have been rising in China, the United States (USA) and Western Europe.

The characteristics of the new trade and investment landscape are highly uncertain. The general view is that what remerges post COVID-19 will be markedly different. The world is unlikely to return to business as usual. We can expect longer-term structural shifts. Digital technology will play a critical role. The World Economic Forum refers to the COVID-19 economic shock as 'The Great Reset'.

Regardless of how the new landscape takes shape, trade and investment will remain critical for jobs and GDP growth. The share of Australia's GDP coming from exports has risen from 12.5% in early 1990 to 22% today [4]. Australia's exports amounted to $493 billion in 2019 [14]. Foreign investment is also critical, with net inflows accounting for 2.8% of Australia's GDP. The total stock of foreign investment in 2019 was $3.9 trillion [7].

Trade and investment are a powerful way to escape an economic slump. Australia's economy is both export-exposed and export-benefiting. If we read the signals of change early and strike fast, we can harness opportunities, mitigate risks and speed up Australia's economic recovery.

Trade and investment megatrends – the coming months and years

A megatrend is a deep-set trajectory of change occurring at the intersection of numerous trends and drivers with implications for present-day decision making. Megatrends analysis is used with the field of strategic foresight to explore and characterise the future. The CSIRO Data61 Insights team has pioneered techniques of megatrends analysis over the past ten years. These techniques have been applied in this study to identify five megatrends reshaping the global trade and investment landscape over the coming months and years:

1 Digital transformation

A vast amount of economic activity has shifted from the physical to the virtual world. And it may not all go back. Telework, telehealth, online retail, online education, and online entertainment are booming. Ten years of digital transformation has happened in a few months.

2 Investing in supply chain resilience

The global trade freeze saw many companies and countries worldwide unable to source the critical goods and services they needed; this included manufacturers, food suppliers and medicine suppliers. As supply chains are rebuilt, buyers will be looking for new, secure, and reliable options.

3 Localisation and staying closer to home

The COVID-19 shock has been associated with a substantial slow-down in global and domestic travel due to border restrictions and safety concerns. People are taking fewer and shorter flights. People's living and buying patterns are coming closer to home.

4 A changing economic landscape

In terms of debt-to-GDP ratios, interest rates, unemployment, and productivity, the global economic landscape has changed. Governments worldwide face unprecedented challenges. The next ten years will be about rebuilding and recovery.

5 Stepping into the new normal

The COVID-19 shock follows Australia's worst drought and bushfire season. It is also happening amidst the emergence of a complex geopolitical landscape. Australia is facing new forms of escalated cybersecurity risk. However, we also have access to greater technological capability than ever before.

An era of rapid repositioning

The COVID-19 impact on global trade and investment is unprecedented. It is associated with ripple-effects that have the potential to reshape the trade and investment landscape creating risk and opportunity.

The massive contraction in trade and investment means that competition will be greater. However, it's not all bad news. There may be a safe-haven effect. Australia remains a very safe, secure, and stable place to invest. We also lead the world in trustworthy, reliable, and high-quality supply chains. It will be important that we continue to generate scenarios, and take strategic actions, within the context of the uncertain and rapidly changing COVID-19 global trade and investment landscape.

Succeeding in global trade and investment markets of the future is a critical component of Australia's economic recovery. Early actions will help Australia achieve first-mover advantage, so we mitigate risk and harness opportunity.

Strategic actions – how to harness opportunities and mitigate risk

ACTION	STRATEGY
1. Developing data-driven trade and investment	There is an opportunity to further develop Australia's data-science capability applied to trade strategy and investment attraction. Given the huge forecast drop in foreign direct investment, attracting funds is likely to become much more competitive. Increasingly, trade and investment attracting organisations worldwide are leveraging artificial intelligence, machine learning and data science to identify the most prospective companies. This allows them to target business development resources where success is most likely.
2. Boosting digital exports	The Australian Government 'Services Export Action Plan' [15, 16] captures digitally enabled services exports and involves industry consultation and a detailed government response to the action plan was published before COVID-19. The post-COVID-19 environment further heightens the extent of the opportunity to boost digitally enabled service exports and the importance of the action plan.
3. Developing a refreshed and expanded R&D investment attraction program	Following the global financial crisis, global corporations ramped-up research and development (R&D) investment. This helped them survive the crisis by developing new products and services. Today, global R&D spending is worth $3.08 trillion per year worldwide. We've also seen advanced economies such as the USA, the United Kingdom (UK), Singapore and New Zealand announce large R&D fiscal stimulus programs. This points towards an opportunity for Australia to attract investment and supply R&D services to the world. The action would involve collaboration across universities, research organisations, industry, and government for a new, refreshed, and targeted R&D foreign direct investment program.
4. Delivering on the perception and reality of the world's safest holidays	Safety always mattered for global and domestic tourist destination decisions. In the turbulent COVID-19 world, it's become a whole lot more important. Australia consistently tops the charts for tourist safety. We are also well placed to develop and implement industry-wide COVID (and disease) safe holidays. This would involve industry-wide adoption of all relevant hygiene, distancing, and other disease-mitigation measures.
5. Building a pandemic-proof international education sector	Before COVID-19, education-related travel services generated $37.6 billion per year and 8% of all export earnings. It is in fourth position after iron ore, coal, and natural gas. Education exports have risen sharply over the past decade, with 15.2% growth over the past five years [7]. The demand for education will remain in the post-COVID-19 world. There is an opportunity to rethink and rebuild this sector in the post-COVID-19 landscape so that it is resilient to pandemics and other global disruptions. This could include a range of digital and offshore education services along with a host of other innovations.
6. Boosting Australia's critical minerals exports	At the global level, the COVID-19 shock and trade disruptions have accelerated concerns about secure, stable, ethical, and reliable supply chains for critical minerals [17]. Into the future, buyers will be increasingly focused on secure and reliable supply chains. Australia has achieved this during the COVID-19 period and is well placed to respond to future demand. A 2019 Australian Government report titled 'Australia's Critical Minerals Strategy' [18] describes how Australia can capitalise on this trend, now elevated in the post-COVID-19 world.
7. Expanding food, agricultural and agri-tech exports	The COVID-19 shock has seen decreased trade in a range of food and agricultural products with notable impacts on meat, seafood and dairy foods. Decreased sea and air freight capacity is creating supply chain problems. There is opportunity for the Australian agri-tech sector to help solve these supply chain issues and sell the solutions globally.
8. Developing an export-earning disaster-resilience technology industry	Global demand for trusted technologies for the management of wildfires, droughts, heatwaves, floods, pandemics, and cybercrime is set to escalate. As we develop solutions to these challenges in Australia there's an opportunity to identify, and supply into, global export markets.
9. Developing trade and investment foresight capability	Strategic foresight involves the systematic exploration of plausible future events to inform current-day decision making. Megatrends analyses, risk analyses, scenario planning, and weak-signals analysis can help Australia gain first-mover advantage in what is about to become a highly competitive global trade and investment landscape. This capability would complement the data-driven trade and investment capability identified above, which uses quantitative techniques leveraging data science and artificial intelligence.

1 Introduction

The COVID-19 global pandemic is associated with an enormous impact on human health, employment, economic growth, travel, and lifestyles across the globe. The magnitude of change in many of the socio-economic indicators presented in this report is unprecedented. Many of the world's citizens will never have experienced so much change over such a short period of time.

The Australian economy has performed well compared to other countries. The latest national accounts update from the Australian Bureau of Statistics reveals a 7% contraction in GDP for the June quarter of 2020. This is the largest quarterly contraction on record [4, 19]. By comparison the total contraction of GDP for the entire Organisation for Economic Co-operation and Development (OECD) reached an unprecedented 9.8% [20]. These are enourmous economic shocks and the pathway to recovery will be challenging.

There is a widespread view that the depth and breadth of the COVID-19 economic shock will be associated with long-term structural shifts. For numerous companies, industries and national economies, business-as-usual is over for the foreseeable future and possibly forever. Many analysts are using the phrase 'new normal' to describe the mid/post-COVID-19 world. The World Economic Forum refers to the COVID-19 pandemic era as 'The Great Reset'.

Despite the extent of the shock, global trade is highly likely to resume its growth trajectory. Economic theories have shown how much trade benefits both buyer and seller; and these forces will re-assert themselves in the mid/post-COVID-19 world. There are already significant signs of recovery. However, there is an expectation that new global trade patterns will be different from old global trade patterns. It is likely that the demand profile for goods and services will shift into new areas. Some markets may disappear; others will emerge. Importers may turn to new exporters for critical products and services to improve the reliability and resilience of their supply chains. New trading relationships will be established. Technological advancement will play a critical role in defining the future trade landscape.

These changes in global trade matter for Australia because exports and imports are critical components of any economic recovery strategy. Every dollar earned from exports has a GDP-multiplier, which boosts the Australian economy, benefiting people's incomes and job opportunities. Export-led growth (ELG) is a well-recognised concept within the field of economics and there is much evidence that exports are an effective means of escaping an economic slump [21-23]. Imports are also essential. Companies across all industries use, and in many cases depend upon, imported goods and services for their business operations. Australian citizens also use and depend upon imports to meet their daily lifestyle and health needs.

Understanding the near and mid-term plausible futures for global trade can help Australia maximise the opportunities and mitigate the risks. This report presents the results of a strategic foresight into Australia's global trade landscape over the coming months and years of the COVID-19 situation. Strategic foresight is a field of research concerned with the systematic exploration of plausible future events to help people make wiser choices. Megatrends analysis is a widely applied tool within the foresight toolkit used to explore the future. Megatrends are powerful trajectories of change that occur at the intersection of numerous trends and drivers.

This report describes a set of megatrends, and underlying trends, relating to the coming months and years of Australia's global trade landscape. Often a foresight study will have longer (decadal) time frames; however, in the current environment things are changing so rapidly that the time frames have been condensed from decades and years down to years and months.

The report also identifies strategic directions for Australian industry to harness the opportunities and mitigate the risks within the new business landscape.

Any economic shock is associated with a shift in the business landscape, creating risk and opportunity. The better we understand the nature of that risk and opportunity, the better is our ability to make smart choices and achieve improved outcomes. This report aims to help people explore the near-term future, make better decisions, and get better outcomes.

2 A snapshot of Australian trade

This section captures headline information about the current profile of Australia's trade with the world, along with some of the issues influencing our trade strategy. This important foundational information sets the scene for strategic foresight.

A long-term trajectory of trade growth. Trade is an essential ingredient of Australia's economic growth story, and our trade with the world has grown substantially over time (Figure 1). Imports meet the critical needs of Australian industries and citizens. Exports have generated substantial income and have boosted economic growth, creating jobs and wealth for Australians. Over the decades Australia has switched between being a net-importer with a trade deficit and a net-exporter with a trade surplus. Since February 2018, Australian exports of goods and services have exceeded imports, generating increasingly large surpluses as a result of increases in resource commodity prices. The extent to which the COVID-19 shock will impact this growth trajectory is unknown. However, the last 20 years have seen systemic shocks from which our trade has rebounded, and the growth trajectory has been maintained [24].

A recent uptick in our trade surplus. Australian exports were particularly strong leading up to the COVID-19 crisis. Despite global trade tensions, in 2019–20 Australian resources earned $293 billion – the largest resource and energy export figure in Australian history [25]. Despite the COVID-19 situation, March 2020 saw a historical maximum of Australia's trade surplus, with exports exceeding imports by over $12.7 billion. The dollar value of Australian goods exported in March 2020 exceeded the value in March 2019 by 16%, mainly driven by exports of gold, crude materials, and mineral ores. Export of gold increased 1.46 times, which added $2 billion to our export basket. Other significant contributors to the positive trade balance in March 2020 were exports of petroleum, petroleum products, metalliferous ores, metal scrap, and crude materials [14, 24].

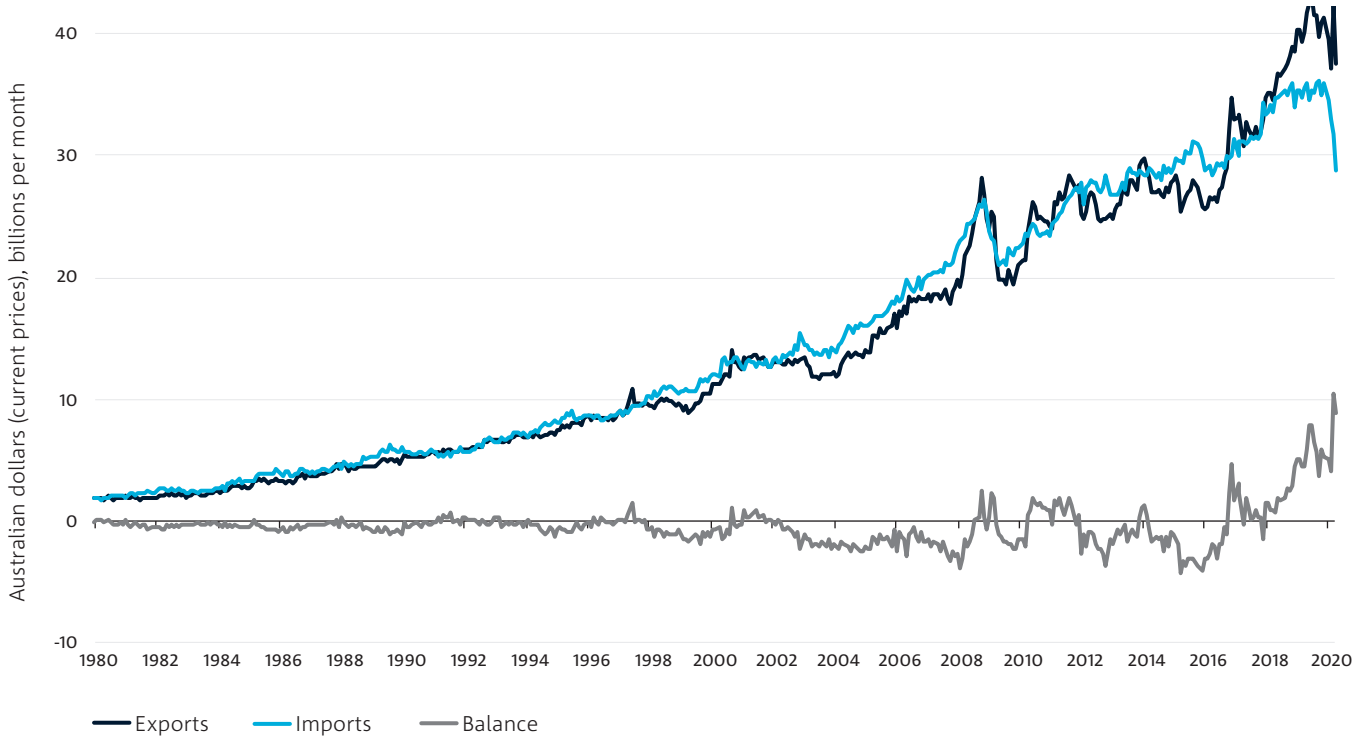

Figure 1. Exports, imports and trade balance for Australia.

Data source: Australian Bureau of Statistics [24]

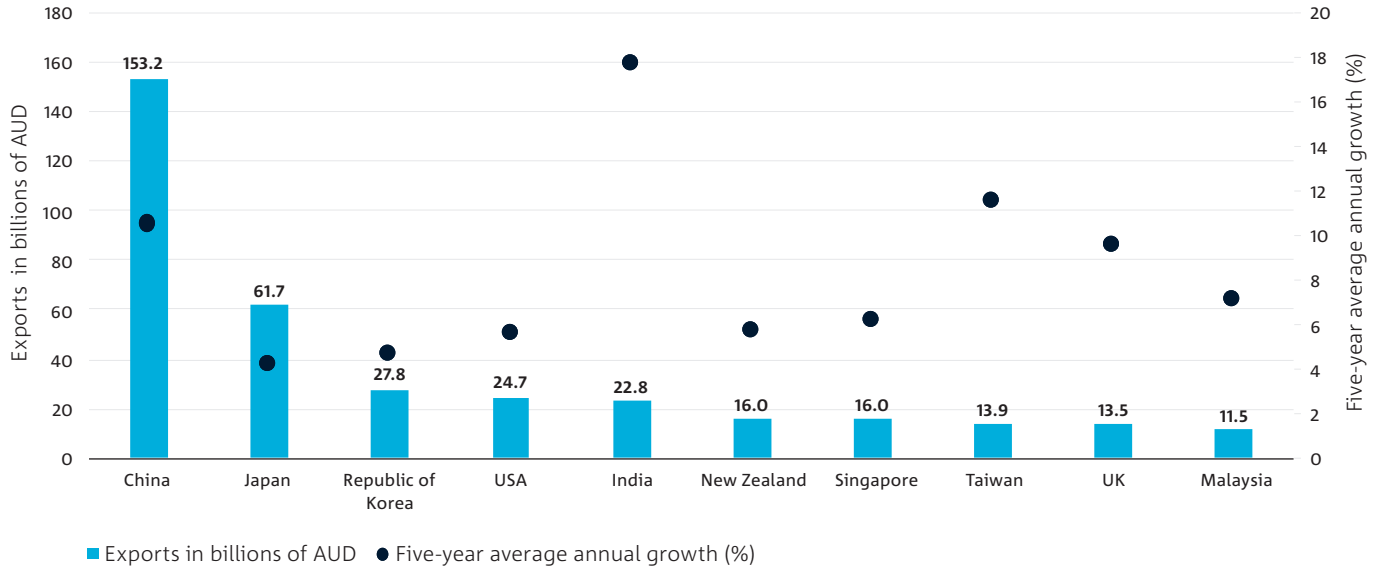

Figure 2. Australia's top ten export destinations in 2019.

Data source: Department of Foreign Affairs and Trade, Australian Government [7]

Who do we trade with? For both exports and imports, Australia's largest trading partner is China (Figure 2). Our exports with China have grown at around 10% year-on-year over the past five years and our imports have grown by 8.2% year-on-year over the same period. In 2019, China represented 32.6% of our exports and 19.4% of our imports. While not yet reaching the same magnitude as China, our exports to India have been growing more rapidly at 17.6% year-on-year growth over the past five years. Other significant export destinations include Japan, the Republic of Korea, the United States (USA), New Zealand, Singapore, Taiwan, the United Kingdom (UK), and Malaysia. Most of these countries are also significant sources for goods imported into Australia with the addition of Germany, Thailand, and Singapore. After China, the second-most rapid growth in imports comes from the Republic of Korea, with a 7.0% year-on-year increase over the past five years [7].

What do we export? Australia's exports are dominated by mineral resources, which in 2019 generated 51% of our total export earnings [7]. Mineral resource exports from Australia are also growing rapidly, with 12.2% year-on-year growth over the past five years. Seven major mineral commodities are iron ore, coal, natural gas, gold, aluminium ores, crude petroleum, and copper ores (Figure 3). After mineral resources, services exports generate the second-largest export revenue for Australia bringing in $102 billion in 2019 with a five-year annual growth rate of 9%. Within our services exports, education and tourism are the most significant sub-categories. Manufactured goods generated export earnings of $54.8 billion, followed by agricultural products at $47.7 billion.

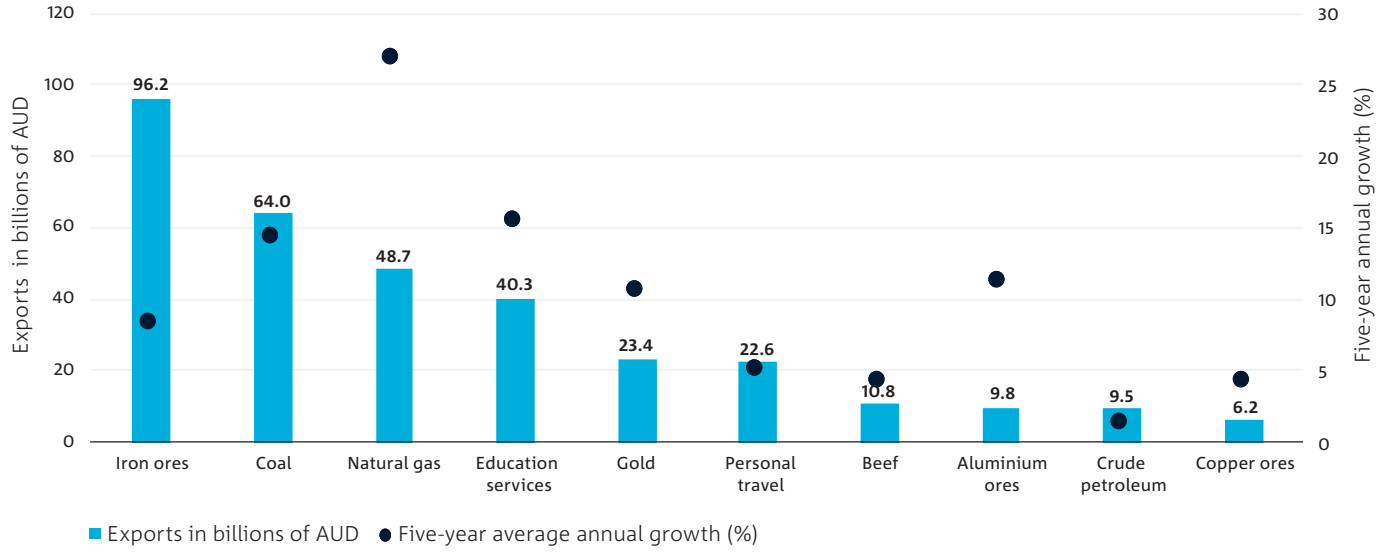

Figure 3. Australia's top ten exports in 2019.

Data source: Department of Foreign Affairs and Trade, Australian Government [7]

What do we import? In 2019 Australia imported goods and services worth $425.3 billion, representing 2.4% growth on the previous year and a five-year average annual growth of 4.6%. The vast majority of imports, worth $81.8 billion, were sourced from China followed by the USA ($51.6 billion), Japan ($26.8 billion), Germany ($18.9 billion), and Thailand ($17.3 billion). The largest imports are 'personal travel services' (tourists, personal travellers, and business travellers) at $46.7 billion followed by refined petroleum ($25.1 billion), passenger motor vehicles ($2.1 billion), telecommunications equipment ($14.9 billion), and crude petroleum ($12.3 billion). Computers and professional services also represent significant imported items for Australia [7]. Overall Australian industry and citizens have come to rely on imported goods for a wide range of personal and business applications.

Australia's travel deficit. For some time, Australian travellers have spent more abroad than overseas travellers spent in Australia. In 2018–19 Australia imported $58.3 billion worth of travel services purchased by businesses and households [5]. This represents money given to other countries by Australians going overseas for tourism, business or personal reasons. By comparison, Australia exported travel services worth $39.1 billion in the same year [5]. This represents money flowing into Australia by overseas tourists, business travellers, and other travellers. This created a travel deficit of $19.2 billion.

> … just six commodities (iron ore, coal, natural gas, gold, aluminium ores, and copper ores) account for half of our total exports.

Increasing product concentration of merchandise exports. Over time, Australia's merchandise export revenues have become increasingly concentrated on a smaller number of physical goods. This means our merchandise exports are becoming less diversified. For example, just six commodities (iron ore, coal, natural gas, gold, aluminium ores, and copper ores) account for half of our total exports. Australia's export profile is more concentrated (and less diversified) than most other advanced economies. This can be seen in the United Nations' Product Concentration Index [12] (Figure 4). This index measures the extent to which a country's merchandise exports are concentrated on a few goods as opposed to being diversified across many goods. A higher index score denotes increased concentration and decreased diversification. Whilst a concentrated export profile can be beneficial, harnessing the power of comparative advantage and specialisation, it can also create risks. Fluctuations in prices for dominant goods and services can cause boom–bust cycles and volatility which can be harmful to economic growth. Australia's export earnings are significantly impacted by changes in iron ore and coal prices in world markets.

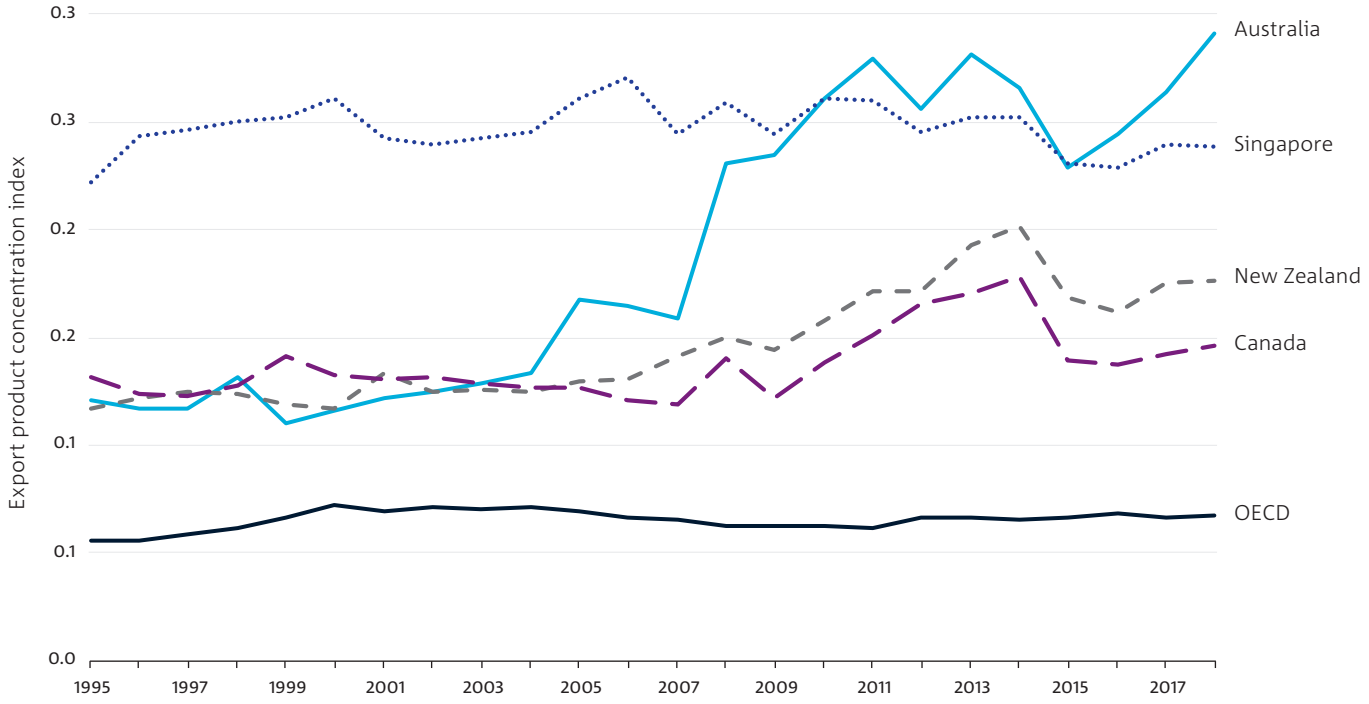

Figure 4. Product concentration index for Australia's merchandise exports.

Data source: United Nations Conference on Trade and Development [12]

Australian exports of unprocessed primary products have grown substantially since the 1990s and accelerated after 2003, rising from $39.7 billion in 2003–04 to $201.3 billion in 2018–19, while the level of manufactured goods remained relatively constant (Figure 5). Primary metal and metal product manufacturing fell during the same period, from 15% to 12% of total annual export values [26].

… and decreasing export diversification by international standards. The International Monetary Fund's Diversification Index is another measure of exports composition. It refers to the concentration in the number of products by country, and the concentration in the export volumes across active products. Higher values indicate lower diversification. Australia has become less diversified in its international trade since the early 2000s, particularly against other advanced economies, but is more diversified than the world in general (Figure 6). This index reflects a sharp increase in commodities exports and a decrease in manufacturing exports during that period.

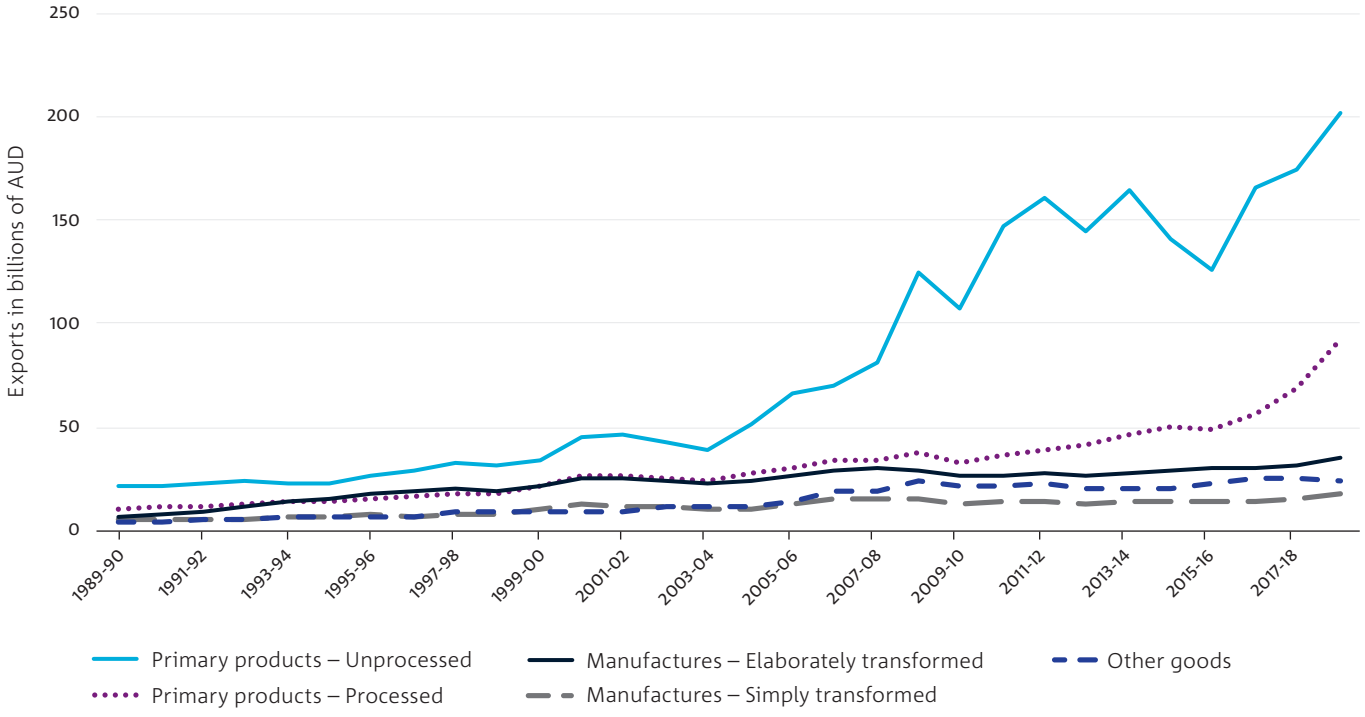

Figure 5. Australian merchandise exports by product type.

Source: Department of Foreign Affairs and Trade, Australian Government [26]

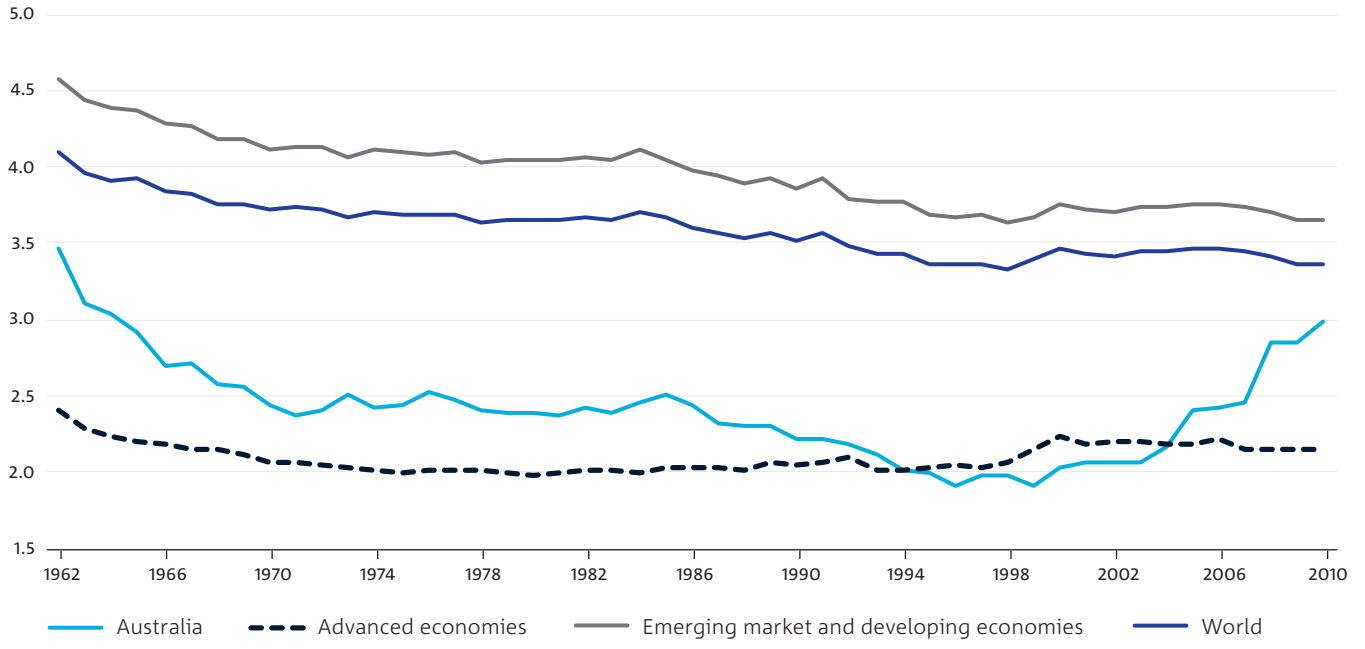

Figure 6. Export diversification index (higher value indicates less export diversification).

Source: International Monetary Fund [27]

The expansion of services trade. The growth of services exports for Australia is of interest because it represents a shift towards a more diversified trade portfolio and new sources of value. Services have traditionally contributed between 11% and 31% to total Australian exports [28]. The share of services has been growing gradually since the 1970s and over the past 15 years the pace of growth was above the average among OECD countries (Figure 7) [29]. Tourism is the most valuable services export, growing over two-fold between 2004 and 2019: from $22.7 billion in 2004–05 to over $ 58 billion in 2018–19 [5].

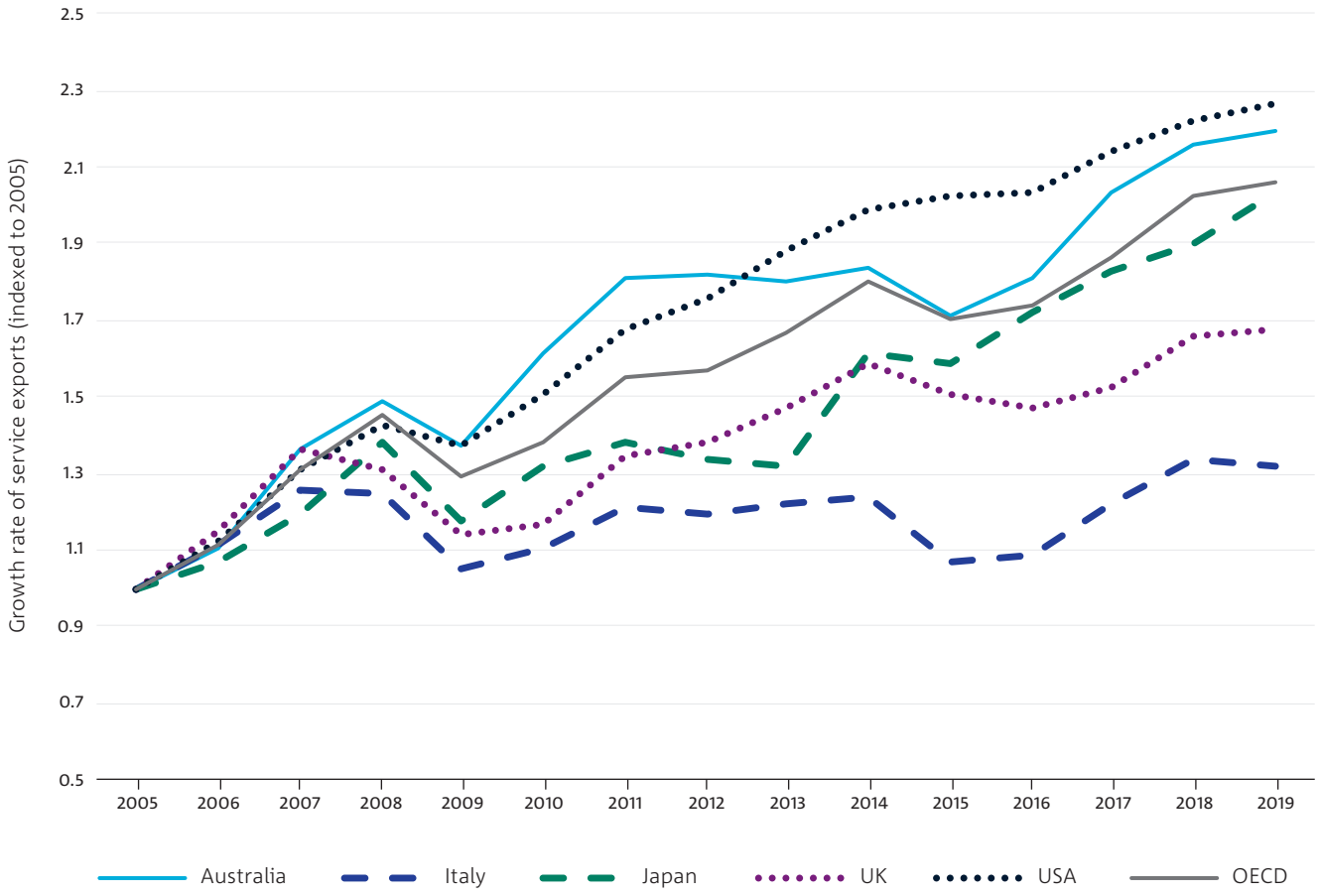

Figure 7. Growth of exports of services in Australia and selected regions.

Data source: Organisation for Economic Co-operation and Development [29]

Exports contribute increasingly to GDP. In the March quarter of 2020, Australia's exports amounted to 22% of GDP and net exports (exports less imports) amounted to 2.8% of GDP. In June quarter of 2020 net exports contributed 1% to GDP, with a record fall in imports (down 12.9%) exceeded fall in exports (down 6.7%) [4, 7]. Over the longer term, exports have grown as a percentage of GDP from 7% in the 1960s to the current level of 22% (Figure 8). This means exports have been an important contributor to economic growth, jobs creation, and wealth generation for Australia. Imports have also grown over this time period, and net exports as a share of GDP have fluctuated around 1% of GDP over the past few decades. According to OECD data [29], in 2018 Australia's exports comprised 24% of GDP compared to the OECD average of 30%. Out of a list of 44 countries, Australia has the fifth-highest exports-to-GDP ratio. The USA has the lowest ratio, with exports comprising 12% of GDP, and Luxembourg has the highest ratio, with exports roughly double GDP.

... the suddenness, ubiquity, and extent of the COVID-19 shock across the entire globe combined with the rapid uptake of digital technology are likely to be associated with significant and enduring structural shifts in global trade patterns.

Export-led growth (ELG). The ELG concept has been comprehensively explored by economics researchers over decades [23]. The idea behind ELG is that exports can rapidly boost year-on-year GDP growth rates, generating increased income and employment for a country's citizens. The ELG concept was studied for Australia by economists at Griffith University in Queensland. By analysing merchandise exports from 1991 to 2012 the researchers found that Australia's merchandise exports in agriculture, minerals, manufacturing, and other products played a 'crucial' role in driving economic growth nationally and especially within Queensland, Western Australia, and New South Wales [21]. Similar findings have emerged from economic research into ELG in Canada [22]. Whilst there is widespread acknowledgement of the importance of exports for GDP growth, cause-and-effect issues relating to ELG are still being fleshed-out by research economists [23]. Some researchers have found that exports lead to increases in GDP whereas others have found that increases in GDP are what lead to increases in exports. Whilst these issues are being explored by the research community there is a high level of consensus that, *ceteris paribus* (holding all else equal), a boost in exports translates to an even bigger boost in GDP. This in turn boosts jobs, incomes, and wealth. ELG strategies are likely to remain a priority of governments seeking to improve national economies.

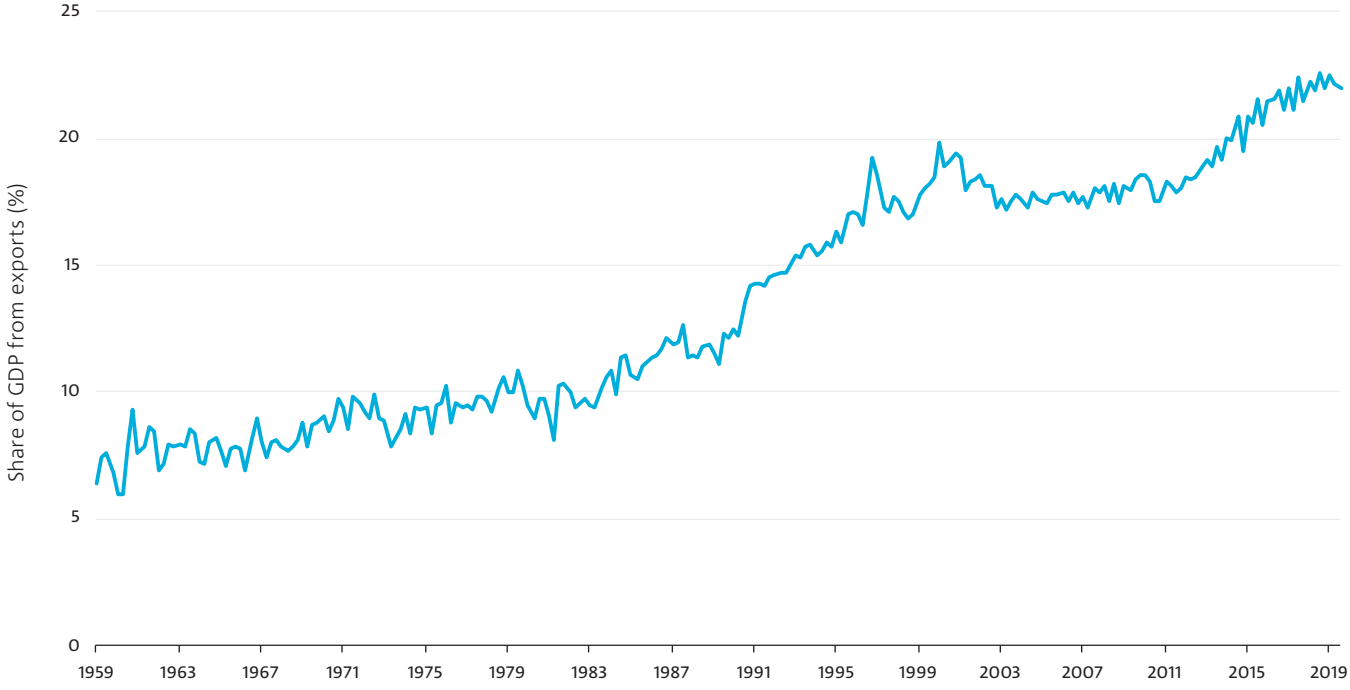

Figure 8. The share of exports within Australia's gross domestic product (GDP).

Source: Australian Bureau of Statistics, National Accounts [4]

Rising international investment in Australia. The total foreign investment in Australia – including both portfolio investment (bonds and shares) and direct investment (other assets) – has grown from $2.8 trillion in 2014 to $3.9 trillion in 2019 (Figure 9, Figure 10). This represents 5.9% average annual growth, with growth of 7.8% in the last year. This is larger than Australia's investment abroad, which amounted to almost $3 trillion in 2019. Direct foreign investment in Australia in 2019 was $1 trillion, with most of this being directed at the mining sector [7]. However, other sectors have strong growth potential. For example, Australia is the seventh-largest tourism market in the world, and Australian federal and state/territory governments have identified tourism investment as a key opportunity for both investors and the tourism industry [30].

Summary of Australia's trading environment. The momentum behind Australian and global growth in trade and investment will most likely overcome the COVID-19 shock soon. Trade has been and will remain, critical for economic growth in Australia along with job-creation, salaries, and lifestyles. The longstanding objectives of improving supply chain resilience, growing and diversifying exports, and attracting increased foreign investment into new sectors of the economy are likely to remain relevant in the mid/post-COVID-19 world. However, the suddenness, ubiquity, and extent of the COVID-19 shock across the entire globe combined with the rapid uptake of digital technology are likely to be associated with significant and enduring structural shifts in global trade patterns.

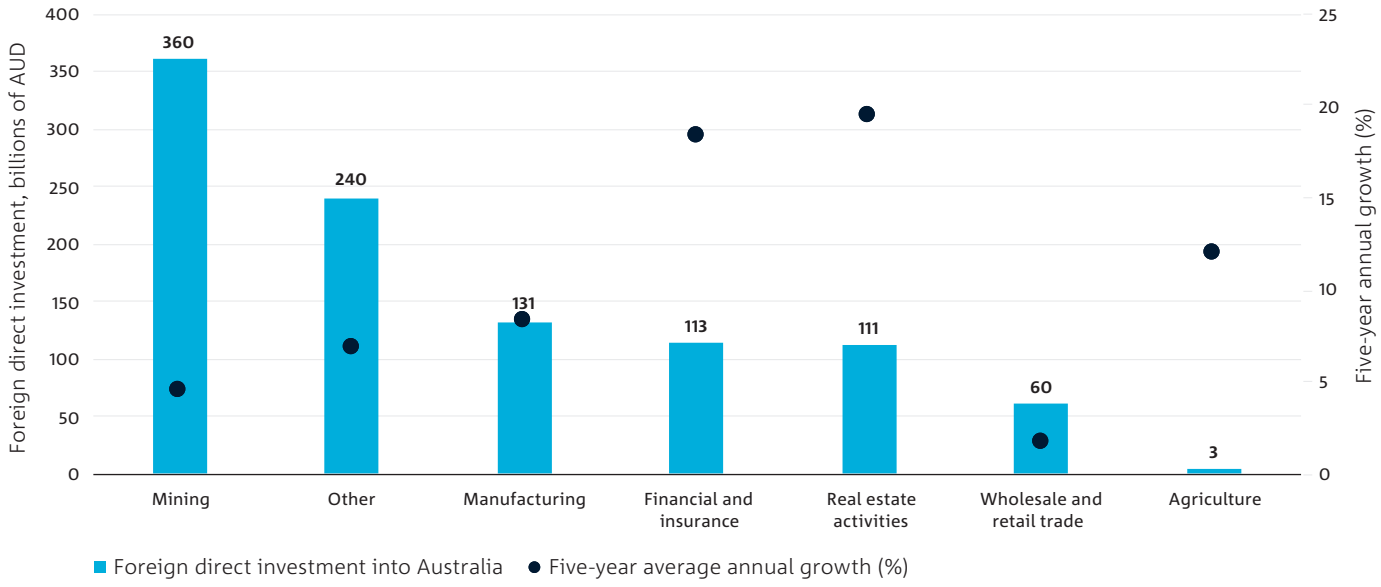

Figure 9. Foreign direct investment into Australian industry sectors in 2019.

Data source: Department of Foreign Affairs and Trade, Australian Government [7]

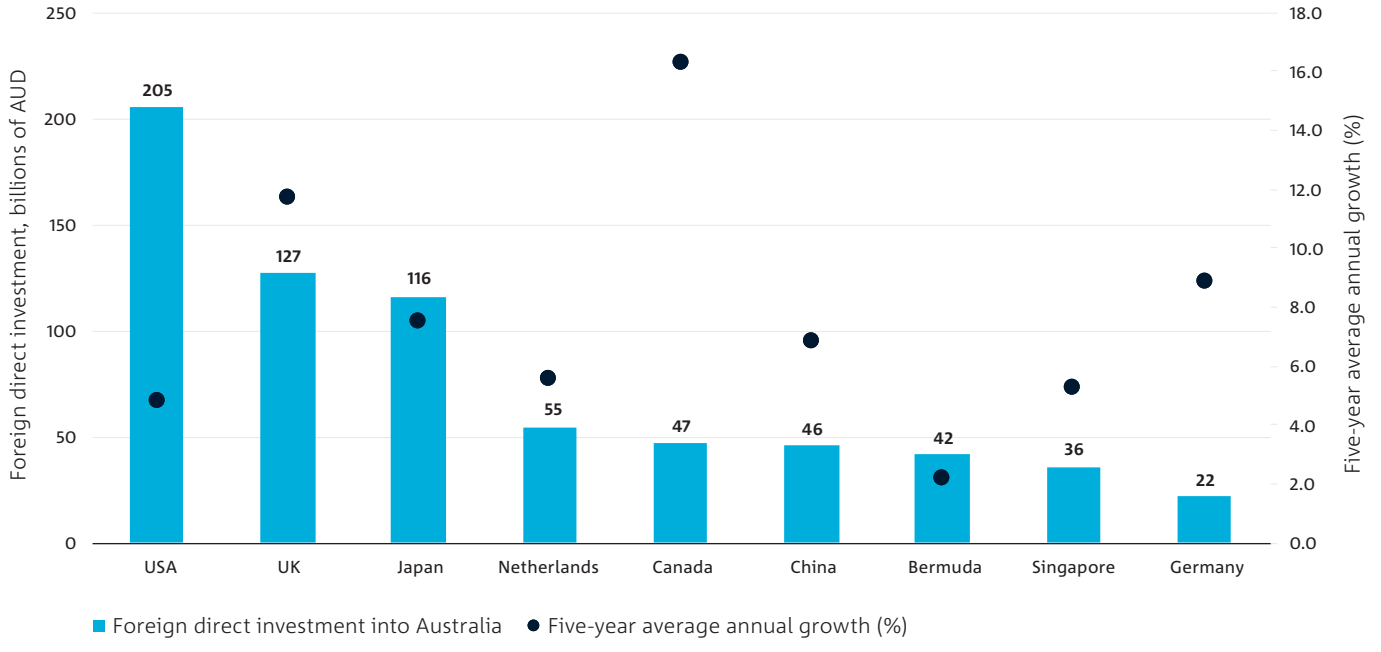

Figure 10. Sources of foreign direct investment into Australia in 2019.

Data source: Department of Foreign Affairs and Trade, Australian Government [7]

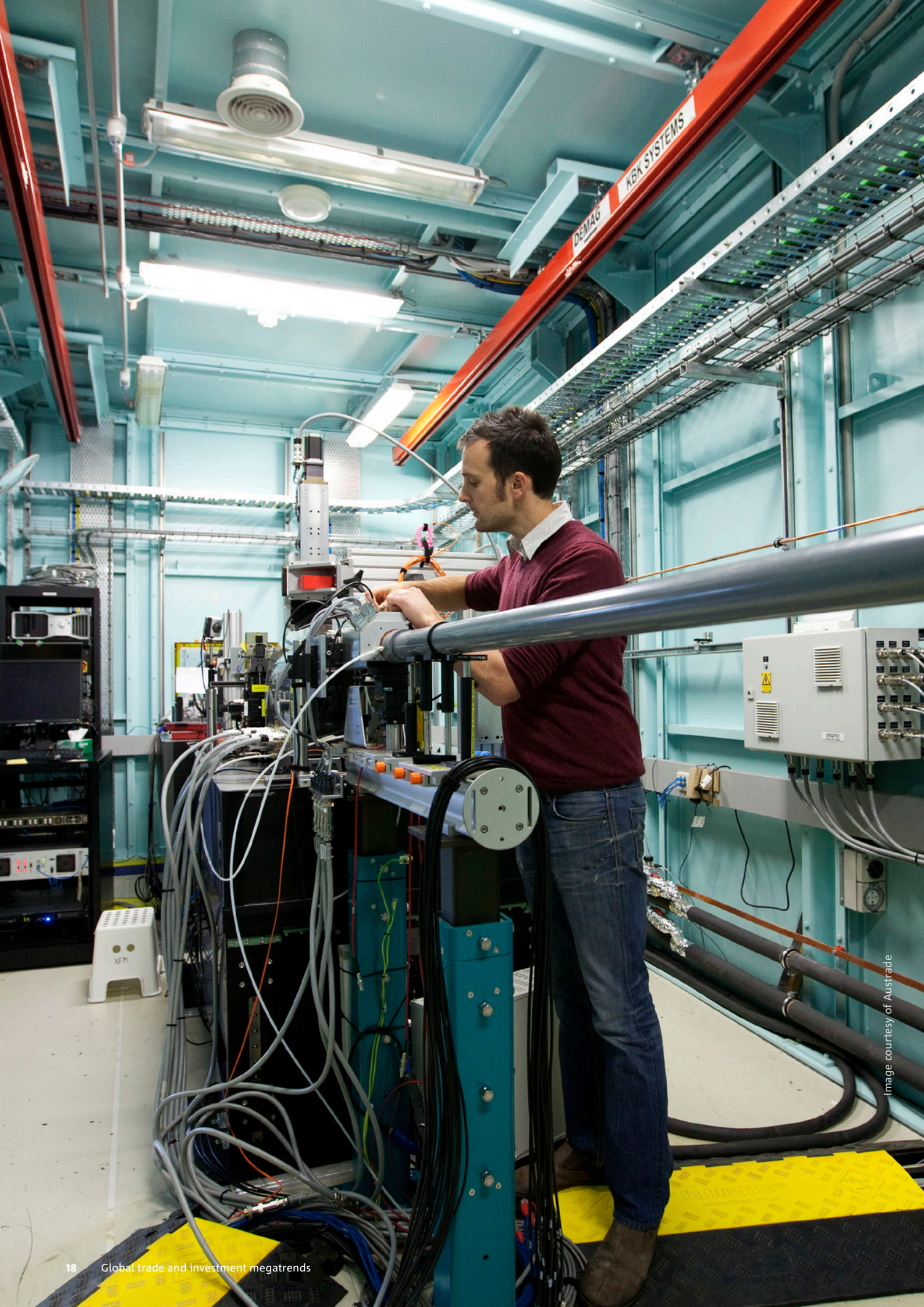

Image courtesy of Austrade

3 Global trade and investment megatrends

A megatrend is a deep-set trajectory of change occurring at the intersection of multiple trends and drivers. Megatrends typically hold both risk and opportunity. Megatrends develop gradually but can express themselves suddenly via shocks such as the COVID-19 pandemic.

Megatrends have implications for current-day operational and strategic decisions. Through a large number of strategic foresight research projects, CSIRO has pioneered a megatrends analysis process, which is documented in the appendix of this report.

In most of our reports, megatrends have decadal time frames. However, in this report, we are looking just months and years into the future. This is because during the current pandemic crisis, so much change is occurring over such a short time period. The trends which comprise megatrends are patterns of change with tighter temporal, typological, and spatial expression.

In this section of the report, we describe a set of megatrends reshaping global trade and investment, with implications for Australia, over the coming months and years.

Megatrends

1. Digital transformation
2. Investing in supply chain resilience
3. Localisation and staying closer to home
4. A changing economic landscape
5. Stepping into the new normal

Megatrend 1

Digital transformation

A vast amount of economic activity has transferred from the physical world to the virtual world. The impacts on global trade and the world economy are likely to be far-reaching and enduring. We've seen a decade's worth of digital transformation occur within the space of a few months. The digital technology sector is by-and-large expanding worldwide amidst the downturn.

Digital technology companies are rising counter-trend on the world's largest stock exchanges. Many have recovered their losses, and some have grown robustly through the crisis. Amidst a global credit crisis some digital technology companies are making large investments in future capability, including recruitment drives and capital expenditure. Telework, telehealth, online retail, online education, and online entertainment are all experiencing unprecedented growth and uptake. Much of the newly virtualised activity is likely to remain virtual post-crisis, leading to long-term structural shifts in global trade.

The main opportunity associated with this megatrend is the chance for Australian companies to sell into new export markets for digital products and services. This applies to the digital technology sector and traditional companies that may convert some, or all, of their product offerings to digital, allowing them to respond to both domestic and global markets. Foreign direct investment (FDI) could also ramp-up within Australia's well-established and rapidly growing digital technology sector.

The digital economy rebound on stock markets. In terms of jobs, salaries, sales, company growth, and stock market performance, the digital economy is showing signs of quicker and stronger growth in the wake of the COVID-19 economic crisis. This is happening in Australia and across the globe. It's the inevitable consequence of economic and social activity being transferred from the physical to the virtual. One of the data signals is the ASX All Technology Index. This index is comprised of companies such as Technology One (enterprise software), Wisetech (transport and logistics software) REA Group (realestate.com and other online property platforms), Appen (artificial intelligence (AI) services), Carsales (motor vehicle buying and selling platform), Afterpay (digital financial services company) and others. Most companies comprising the All Technology Index have businesses built around software and/or digital technologies. Since the crash, reaching a low on 25 March 2020, the ASX has been regaining value. However, despite a deeper dive, the All Technology Index has been moving back much faster (Figure 11).

Jobs growth in the digital economy amidst a downturn (LinkedIn data). On 30 March, LinkedIn published data [11] on changes in staff hiring rates, giving us sectoral insight into the impact of COVID-19 on jobs. The hiring rate is defined by LinkedIn as the number of new hires divided by LinkedIn membership. In Australia, the UK, and the USA, these data show a sharp decline in hiring rates since early March. In Australia, the industries hardest hit with significant decreases in the hiring rate from the same time last year include education (–25.6%), consumer goods (–11.7%), and recreation and travel (–10.8%). However, some industries are bucking the trend with higher hiring rates this year. These include finance (10.3%), healthcare (12.6%), and the top-performing industry of software and information technology services (17.3%).

...with Seek data showing a similar pattern. Another popular Australian jobs and employment platform, Seek, also publishes data on the impact of COVID-19. Their 'Employment Snapshot' [32] published on 21 May 2020 listed five categories in the section 'where the jobs are': (a) healthcare & medical; (b) trades & services; (c) information & communication technology; (d) manufacturing & transport logistics; and (e) mining, resources, & energy. Within the information & communication technology sector, employers were especially looking for developers/programmers, business systems analysts, software engineers, and project managers.

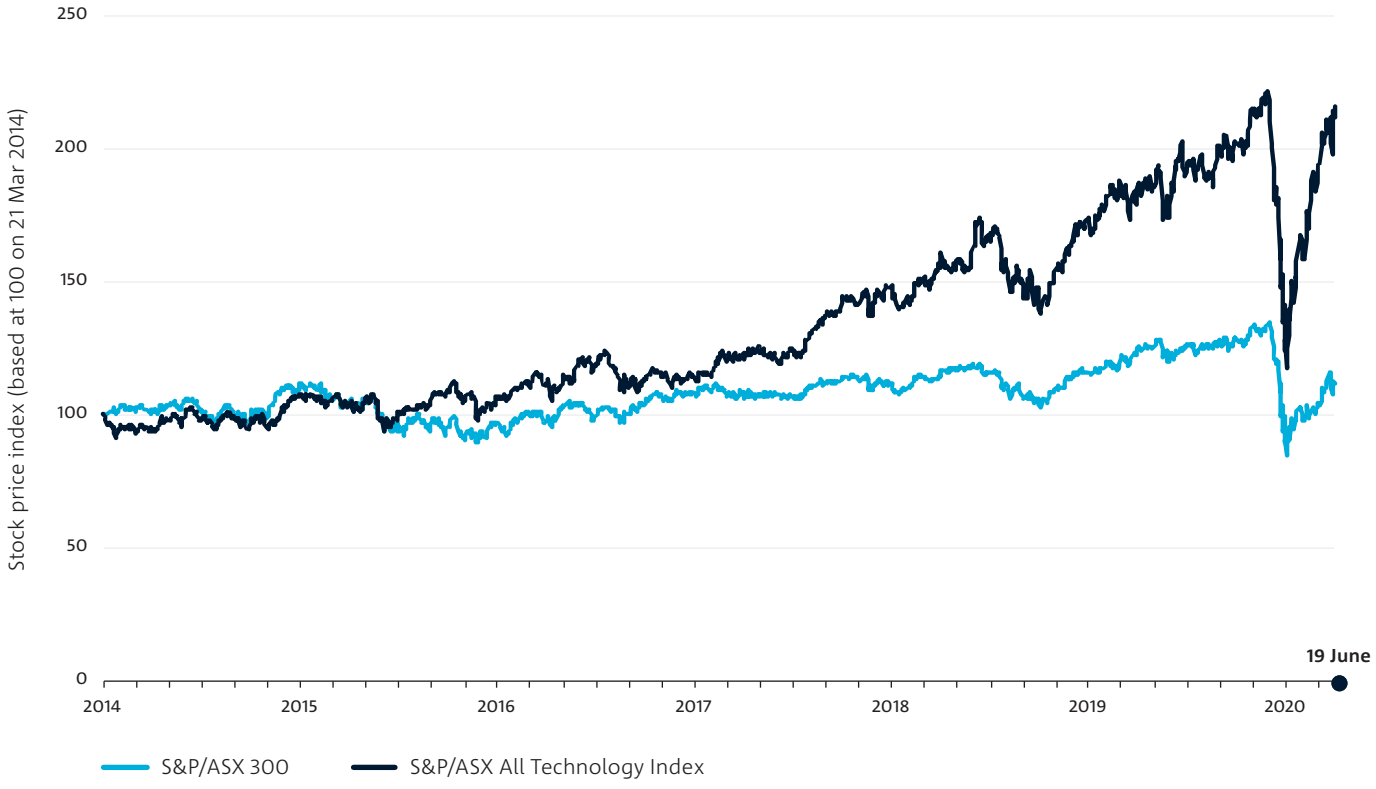

Figure 11. Comparison of digital technology sector against the general market.

Data source: S&P Dow Jones Indices [31]

The online delivery sector is expanding rapidly with a view to long-term structural shifts. On 7 May it was reported that Coles signed a $400 million deal with industrial landlord Charter Hall for two high-tech industrial sheds in Sydney and Melbourne [33]. This was in response to a 24% jump in online sales in the first half of the 2019–20 financial year (before COVID-19) and a surge in demand during the COVID-19 crisis which overwhelmed capacity [33]. Woolworths has doubled online delivery capacity to capture a forecast $3 billion growth next financial year and recruited an additional 5,000 third-party couriers to complement its current fleet of 800 delivery trucks. Amidst an employment crisis, Woolworths announced 20,000 new jobs in late March to boost online delivery capabilities. They are making similar investments in infrastructure, skills, and technology [34].

Australia and worldwide digital trade (United Nations data). United Nations data indicate a greater value of digital exports from Australia, roughly four times the industry estimates given by the Export Council of Australia [35]. However, the United Nations' estimates may cover different (additional) categories of trade activity and involve different calculation methods. Since 2005 the United Nations has maintained a dataset on international trade in digitally deliverable services (Figure 12). These services include 'insurance and pension services, financial services, charges for the use of intellectual property, telecommunications, computer and information services, other business services and audiovisual and related services'. They are based on the concept of services, which can be information and communications technology (ICT) enabled and involve the exchange of intangible goods and information products delivered via the internet. Between 2005 and 2018, Australia increased exports of digital services from $11 billion to $23 billion per year (Figure 12). During the same time, the world increased exports of digital services from $1.7 trillion to $4.3 trillion [36]. This represents a major increase in digitally delivered services being traded, and the trend is likely to increase and receive a boost in the post-COVID-19 economy where so much more activity has transferred to digital.

Australia's digital trade (industry data). According to an analysis by AlphaBeta and the Export Council of Australia [35], Australia's digital goods and services are worth $6 billion per year, with anticipated growth of 3.1 times, reaching $19 billion by 2030. The Council also estimated that imports of digital products and services create $43 billion/year of economic value within the economy via productivity uplift. This is forecast to reach $192 billion by 2030. Productivity uplift comes from digital technologies such as online mapping tools, internet search tools, AI platforms, and other such technologies which have been developed offshore and are being used (or imported) into Australia to achieve business efficiency and process improvements.

Once an Australian unicorn, Atlassian is now growing despite the downturn. At the end of March 2020, Australian NASDAQ-listed software and technology company Atlassian reported third-quarter revenue of US$411.6 million [37]. This represents 33% year-on-year sales growth amidst the largest economic downturn in history. Atlassian's share price is performing well and according to media reports, they made a record number of new hires in March via a recruitment drive, which added an additional 200 staff to their workforce. The company's leaders have made statements in the press about plans to significantly grow the company during and after the COVID-19 economic slump [38].

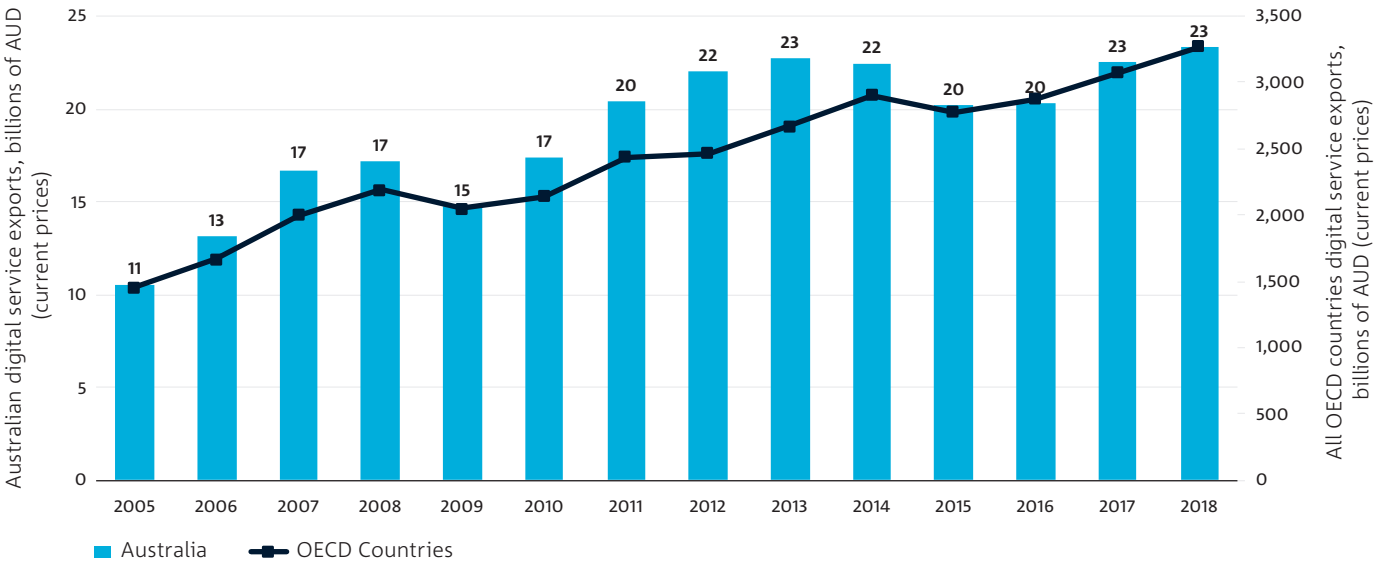

Figure 12. Digitally enabled service exports.

Data source: United Nations Conference on Trade and Development [36]

An explosion of telework. A recent study by the Brookings Institution [39] published 6 April during the pandemic found that half of all US workers were telecommuting. Although we could not (at the time of writing) find an official statistic on how many Australian workers have switched to remote internet-based work during the COVID-19 crisis, Australia has been on a long upward trajectory for teleworking. The Australian Bureau of Statistics estimated that in 2016 almost one-third of employed persons, representing 3.5 million people, regularly worked from home in their main job. It is likely that the ongoing COVID-19 restrictions will see a surge in working-from-home arrangements. Many workers may only partially return to the office and some may never return to the office. A large number, possibly the majority, of Australian workers have become equipped and accustomed to working-from-home arrangements for an extended time, which, by the conclusion of the COVID-19 period, is likely to have spanned years. The habit is likely to persist. This is a worldwide trend. Many Australians may become increasingly able to generate income in global e-commerce labour markets. Telework represents a powerful opportunity to boost digitally enabled exports and build a more resilient workforce.

Telehealth usage has sky-rocketed. In 2018–19 the average number of telehealth consultations in Australia was 8.8 per 1,000 people [40]. This is much lower than the highest telehealth usage in Ontario (Canada) with an average of 72.2 consultations per 1,000 people [41]. In the course of the pandemic, the Australian Government has temporarily relaxed funding restrictions on access to telehealth services [42]. Coupled with the lockdown, this resulted in a rapid increase in the number of telehealth consultations, with almost 6 million consultations in April 2020 and 5.6 million in May 2020 [40, 43]. Telehealth is expected to be important and be increasingly used beyond the pandemic as an efficient way to deliver timely healthcare. Telehealth could help to achieve a 46% reduction in healthcare expenditure under the Medicare Benefits Scheme [44]. There are also opportunities for telehealth services to assist in the post-pandemic psychological recovery, helping Australians through problems of ongoing financial and emotional hardship.

Expansion of online retail and changes in international versus domestic spending. According to the April update of the National Australia Bank Online Retail Sales Index, Australians spent $34.27 billion on online retail in the 12 months leading up April 2020 [45]. This represents a year-on-year growth of 58.5%, outpacing the growth of economy-wide retail sales (Figure 13). During the COVID-19 crisis in 2020, online retail increased month-on-month by 3.3% in February, 8.1% in March, and record 16.2% in April – the highest ever recorded growth since the start of NAB series in 2012 [45]. The growth was driven by domestic online retail sales whilst international online retail sales contracted in March and returned to low-pace growth in April. The switch from international to domestic was particularly apparent for the fashion retail category. The strongest growing domestic online retail sectors included takeaway food, groceries, and liquor along with games, toys, recreational goods, and homewares. While the switch to online retail propelled by COVID-19 creates risks for traditional bricks-and-mortar retailers, it creates an opportunity for Australian companies to increase sales. There is also an opportunity to leverage domestic demand to build new export opportunities as e-commerce globally is also expanding rapidly in the mid/post-COVID-19 economy. Often, online retail models can scale to global markets at a low cost.

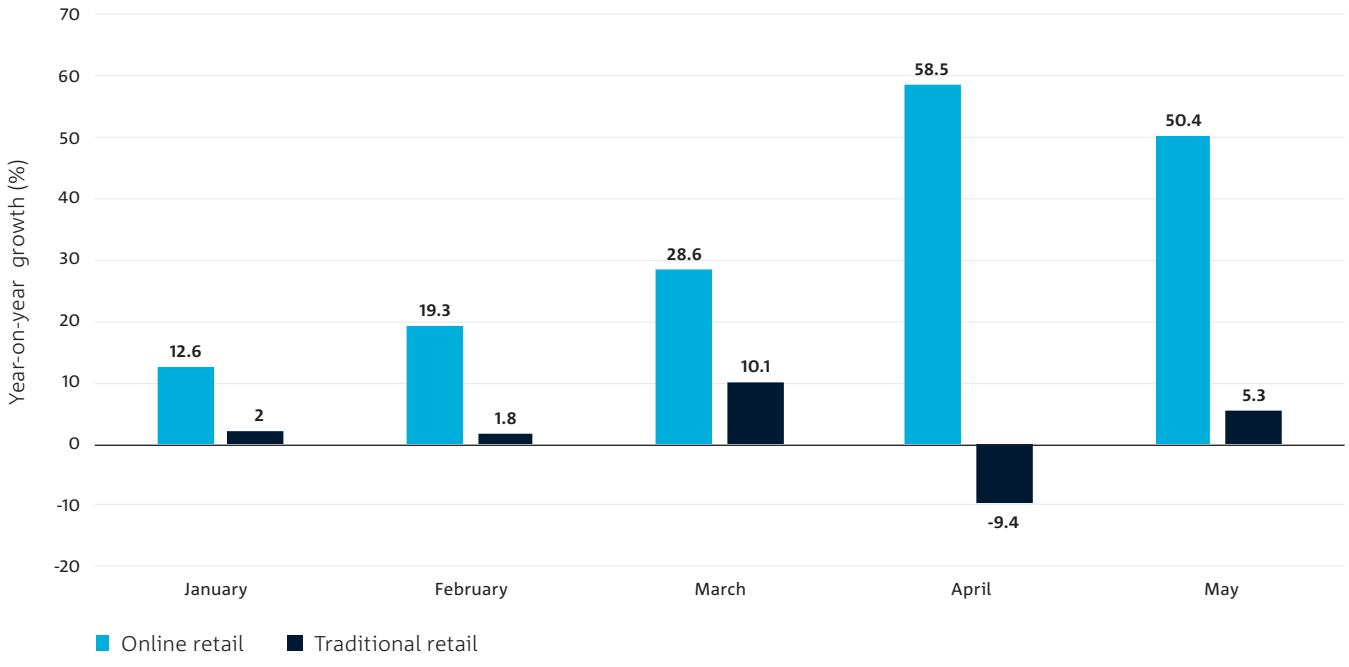

Figure 13. Online retail sales index and traditional retail sales (2019–2020).

Data source: National Australia Bank [45, 46]

Australia's ranks tenth-best worldwide in business-to-customer e-commerce. The United Nations E-commerce Index [47] measures an economy's capability to support online retail. It's comprised of four indicators: (a) the percentage of the banking-age population using some type of mobile money service provider; (b) the portion of the population using the internet; (c) a measure of postal service reliability; and (d) the per capita rate of secure internet servers. Up from eleventh place in 2018, Australia ranks in tenth place for 2019 after Germany. The top three countries are the Netherlands, Switzerland, and Singapore.

The rise of online education. According to the United Nations, during the first two months of the COVID-19 threat, over 190 countries and 1.57 billion students worldwide were impacted by partial or complete closures of school, university, and college campuses [48]. The recent data for 11 June 2020 show an estimated 1.1 billion students across the globe were learning remotely. This represents 63.3% of all students, with nation-wide shutdowns remaining in 129 countries [49]. As of 13 May, 100 countries had not announced plans to reopen, and 65 countries had plans for partial or full reopening. Another 32 countries planned to end the academic year entirely online [48]. This unprecedented and rapid shift to online learning is likely to be associated with longer-term structural shifts and cultural changes in learning styles. Digital technology is likely to play a much greater role in how people learn at all life stages. There may be a permanent increase in remote and online learning activity. This has implications for Australia's education sector, impacting both universities and schools. The impacts could be felt via a changed demand profile from international students and changed learning styles and skills/competency expectations by employers.

Public sector real-time data-driven governance. Turning to data-driven decision making has been on the agenda for policymakers and governments for decades [50]. The COVID-19 pandemic has created an environment with high-stakes, where decisions at the national and regional levels need to be made at rapid pace and rely on real-time data. It has arguably never been the case before that provision of timely and accurate data would become such an imperative for decision makers, in both the public and private sectors. For governments, these decisions included incubation periods, medical resourcing, and shutdown stages, as well as economic stimulus and welfare programs. The crisis has also demonstrated the difficulties associated with data collection, interoperability, security, and ethical data use [51]. The coming months could bring more problems that would require intensive data analytics. Emergence from the crisis and operations beyond it requires better data capabilities and aspirations to create the data-driven culture in the public sector – one of the core principles of the digital government [50].

The effect of digital connectivity on property markets and cities. For some time, there has been an expectation that digital technology would break the requirement to be at a particular location for work; and that this would lead to changed settlement and mobility patterns. There's a possibility that the COVID-19 situation could speed this up. According to data from real estate analytics firm CoreLogic [52, 53], during the COVID-19 period thus far house prices are outperforming apartment prices and regions are outperforming cities. For example, for April 2020, Australian capital city median residential property prices increased by 0.2%, whereas regional property prices increased by 0.5%. Regional Tasmania showed the strongest growth, with an increase of 1.3%. This happened against a backdrop of a significant decline in transaction volume. For May 2020, city residential property value decreased by 0.5% compared to regions, which held constant with no change in median value. The exception in capital city price movements was Hobart, which had the largest increase of all capitals at 0.8%, while regional Tasmania and regional South Australia had increases of 0.6% and 0.7%, respectively. While property markets are subject to much uncertainty, and these data do not permit definitive conclusions or forecasts, there are two possible driving forces at play. Firstly, lockdown and rising unemployment may be associated with people bringing forward retirement and moving to regional areas with lower property prices and attractive lifestyle attributes. Secondly, these same qualities may be sought by people who are now able to use telework, telehealth, online retail, online education, and digital connectivity to live, work, and play effectively in a regional area. It's possible that virtually connected workforces, spurred by COVID-19, could further reshape settlement and mobility patterns beyond the pandemic.

Long-term growth of the digital workforce. According to the most recent Australian Computer Society and Deloitte Digital Pulse Report [54] Australia's digital workforce is predicted to grow by 100,000 workers between 2018 and 2024, reaching a size of 729,000 workers. This follows seven years of steady growth since 2011, with the digital workforce growing at 2.5% per year compared to the overall labour market growing at 1.7%. Enrolments in ICT degrees at Australian universities have also grown, and in 2017 there were 36,000 enrolments and 6,000 degree completions. All industry sectors are seeing growth in the digital workforce. However, the growth is fastest in healthcare with the digital technology workforce set to grow at 7.3% per year.

Digital companies are geared for R&D. Recent research published in the Harvard Business Review [55] finds that digital companies are different from other companies, primarily due to their R&D investment. The researchers found large digital technology corporations such as Facebook and Alphabet spend 19% and 15%, respectively, of sales on R&D whilst smaller and emerging digital companies may spend up to 50%. This compares to the general marketplace in the USA, which is closer to 2%. Many digital companies, like WiseTech on the ASX, have come into existence via innovation and R&D to create new software systems that uplift productivity for their customers. Such companies understand and depend upon new product development. They have innovation and R&D built into their cultures. For example, ASX-listed company Technology One has increased R&D spending from $27 million to $60 million from 2010 to 2019. The company spends around 21% of revenue on R&D [56]. Australian ASX-listed logistics software company WiseTech invested $113 million in R&D in 2019, representing 32% of revenue and up from $30.6 million in 2015 [57]. These and other such ASX-listed technology companies have much higher rates of R&D spending intensity that the general market. Just as the post-global financial crisis years saw a boom in R&D spending amidst deep cost-cutting [58], the current time may see another boom in digital innovation and R&D. This is because when business as usual is over R&D is needed to build another type of business.

SafetyCulture – our next digital unicorn. As reported in the media [59], in early April 2020 Australian Townsville-based digital company SafetyCulture broke through the $1 billion valuation threshold. This happened after Sydney's TDM Growth Partners injected $60.5 million into the company leading to a $1.35 billion pre-money valuation. With a rapidly grown pathway since being founded in 2012, SafetyCulture has developed new software tools for improved safety inspections and audits that it sells to organisations. Like many rapid growth stories in Australia's digital technology sector, SafetyCulture's success is based on a high-quality software product which meets a critical industry need. This is like ASX-listed WiseTech, which developed transport and logistics software. Software and digital tools enable rapid scale-up. SafetyCulture has become another Australian digital company exporting information products worldwide.

Science, research and technology-led stimulus packages. Recent times have seen some of the world's advanced economies announce COVID-19 economic recovery/stimulus packages focused on science, research, technology, and innovation. On 20 June 2020, Singapore announced a $20.57 billion R&D package for economic recovery from their worst downturn ever, caused by COVID-19 [60]. This investment forms part of a larger five-year national R&D plan yet to be announced. The Singapore Finance Minister is quoted in Bloomberg saying, '... but we are going further [than other countries], investing to give everyone a springboard, to bounce back from this even stronger ... we never stop thinking of tomorrow' [60]. On 1 July 2020, the UK Government announced it would increase public R&D investment to $27.62 billion per year by 2024 and achieve total R&D spending of 2.4% of GDP by 2027. The UK roadmap states, 'Research and development will be critical to economic and social recovery from the impacts of COVID-19' [61]. On 4 June 2020, the New Zealand Government announced a $376 million R&D package to stimulate the economy and escape the COVID-19 slump. This includes a $140 million R&D loan scheme to allow businesses to continue R&D funding and a $184 million package for Crown Research Institutions plus other activities [62].

Path dependencies and the emergence of technology industries. A team of researchers from European universities, publishing in the journal Economic Geography [63], studied the emergence of technology industries in 70 Swedish regions over 30 years from 1969 to 2002. They found that successful job-generating technology industries emerged from longstanding traditional industries. For example, forest-tech industries emerged from Sweden's forestry regions. This is happening in Australia and is seen in our mining-tech and agri-tech sectors.

Australia's mining equipment, technology, and services (METS) sector. The Australian METS sector emerged from Australia's mining industry, one of the world's most successful mining industries in terms of growth, jobs, exports, safety, and environmental performance. Today the METS sector adds $92 billion per year to the Australian economy, employs 300,000 people directly (this number rises to 503,000 when including indirect jobs and supporting businesses), and has been growing at 7% year-on-year [64]. A few decades ago, this industry barely existed. It grew off the back of our longstanding mining industry. The technologies being developed in the METS sector have spillover benefits to the economy as they are applied and further developed in other sectors. Industry bodies estimate that Australia's METS sector exports $15 billion per year of products and services and invests $4 billion per year in R&D [65]. The METS sector is a powerful Australian example of how a technology industry can emerge from an existing industry.

SUMMARY

Ten years of digital transformation in a few months

Overall, this megatrend paints a picture of rapid, widespread, and deep digital transformation fuelled by the necessity of remote working, learning, shopping, healthcare, communication, entertainment, and other activities. There will be opportunities for Australian companies to ramp-up digitally enabled exports. There will also be opportunities for Australian companies to acquire domestic and globally produced digital technologies to improve the efficiency of their operations. Lastly, this megatrend suggests that a significant number of Australian workers in regions and cities will increasingly generate income working from home and participating in global e-commerce. We don't yet have visibility of this economic activity in official statistics; however, it may become an increasingly significant source of employment, income, and GDP growth.

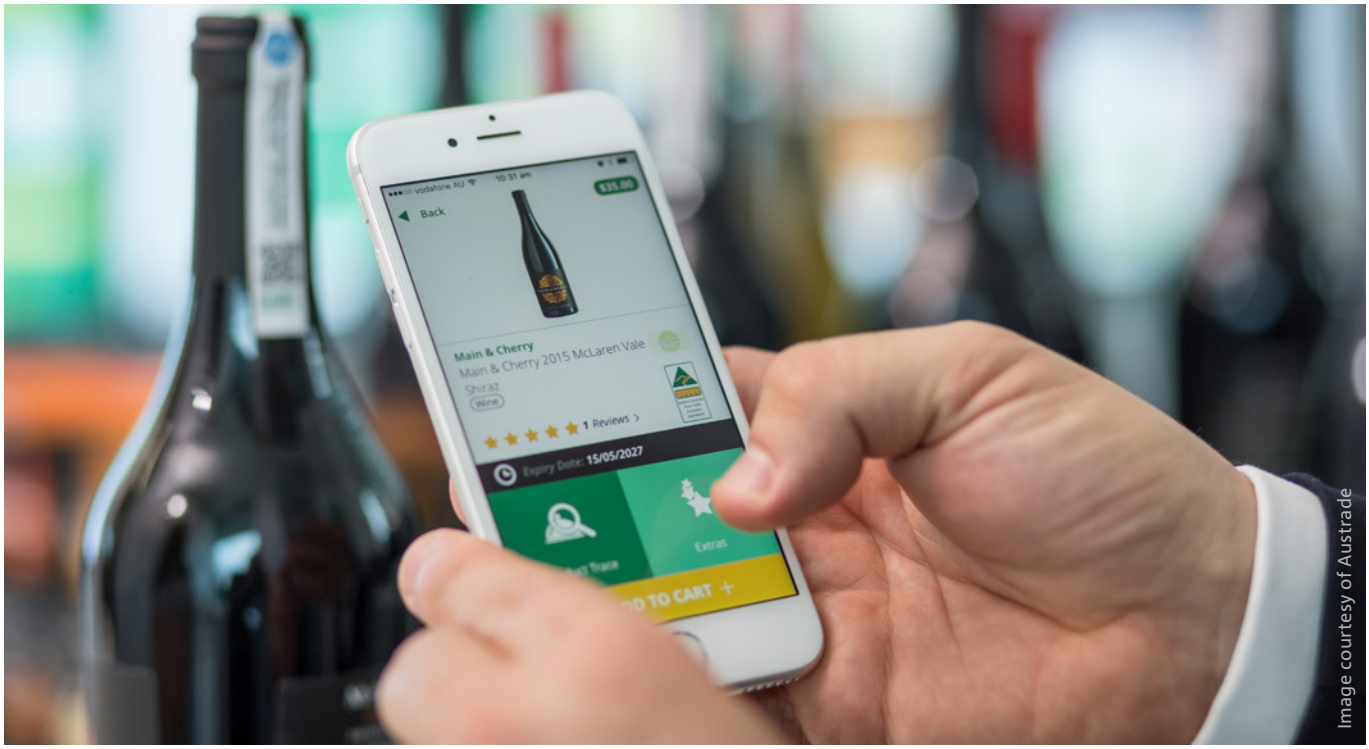

Image courtesy of Australe

Megatrend 2

Investing in supply chain resilience

Many companies in Australia and worldwide faced closure, or even bankruptcy, as global supply chains have frozen during the COVID-19 crisis. Such companies have been unable to source critical inputs needed to produce their products and services.

For many industries these supply chain failures coincided with unprecedented demand fluctuations such as panic or emergency buying. This led to shortages in critical products such as personal protective equipment (PPE) needed by healthcare workers, empty supermarket shelves, mail delivery delays, and spiking business debt levels.

Due to these challenges, companies are increasingly searching for more resilient, stable, and diversified supply chains. Companies are also likely to invest in technologies and innovative solutions for smarter supply chains and logistics systems. A shift towards supply chain resilience and diversification creates opportunities for Australian companies to meet global demand. Local suppliers are in the spotlight and may benefit from this shift.

The global trade freeze. The COVID-19 shock has decreased global trade by 5% in the first quarter of 2020. The second quarter has observed the world merchandise trade volume decline by 14.3% [3]. Commodity prices have fallen by 20.4% in March 2020, the largest drop on record. By comparison, during the global financial crisis, the maximum month-on-month decline reached 18.6% [66].

Most international trade sectors showed a decline in trade by April, including automotive, energy, chemicals, textiles, electrical machinery, and other sectors. Some categories of trade stabilised or increased. Trade in the agri-food sector remained relatively stable. Trade in COVID-19-related medical products more than doubled in April 2020 [3]. All countries and world regions have been impacted. Although trade in East Asia and the Pacific regions performed better and started showing signs of recovery in June [3], prospects for a full recovery within the region are unclear.

An uncertain pathway to recovery. International trade for the remainder of 2020 is highly likely to remain below 2019 levels. The United Nations expects year-on-year declines in trade to reach 20% for 2020; other predictions vary between 13% and 32% [3]. The magnitude of the trade disruption over the coming years is highly uncertain. The extent of recovery will partly depend on the success of national economic recovery strategies [3]. Without economic growth leading to increased demand for goods and services, trade will remain constrained.

Supply chain disruptions. The disruption to global supply chains due to lockdowns is unprecedented [67]. Over 90% of Fortune 1000 firms, including many high-tech companies, have reported severe supply chain disruptions due to COVID-19 [68]. Car manufacturers such as Hyundai, Nissan, Fiat, and Chrysler temporarily closed production lines in South Korea, Japan, and Serbia due to supply shortages of parts from China [69, 70]. Supply chain disruptions resulted in a constrained supply of high-tech goods such as iPhones and Lenovo computers [71]. The disruption of international production networks may last long after borders reopen, and restrictions are eased. This will lead to a search for new, diversified, resilient, reliable, and cost-effective supply chain solutions.

Changing trade patterns for manufactured goods. Over the past few decades China emerged as 'the factory of the world' and, in 2013 became the world's largest trading nation. The McKinsey Global Institute's China-World Exposure Index [72] has been steadily rising since the year 2000. At the same time, the exposure of China to the world has been declining over the past decade. The Chinese economy is shifting towards domestic consumption with reduced imports [72]. Interruptions of supply chains with China in early 2020, combined with trade conflicts, have highlighted import-dependency issues [73]. Future geopolitical uncertainties may lead to changed trading patterns [72]. China is Australia's largest trading partner [74]. Australia relies on imports from China for a range of 595 goods, from ballpoint pens to pharmaceuticals, first aid kits, fertilisers and garlic [75]. COVID-19 may accelerate the trend of manufacturing shifting from China to other hubs like Vietnam, Thailand, and Mexico.

Changes in US and China trade. The USA imported US$107 billion worth of goods from China between January and April 2020, which is down from US$141 billion over the same period in 2019 [76]. While imports from China to the USA have substantially decreased, exports from the USA to China have remained relatively stable. Over January to April 2020 the USA exported US$31 billion worth of goods to China, which is down from US$34 billion in 2019 (Figure 14).

Renewed interest in local manufacturing. The COVID-19 pandemic is associated with renewed interest in local supply chain solutions. Policy leaders from the USA, Australia, and Japan have commented on the need to nurture local manufacturing and reduce reliance on imported goods [77]. In May 2020 the Minister for Industry, Science and Technology announced the Australian Government's focus on building the nation's manufacturing sector to strengthen Australia's resilience to global supply chain disruptions [78]. For example, in response to the surge in demand for PPE such as masks, face shields, and hand sanitiser, Australian manufacturers have been able to pivot quickly to make the required products [79].

The benefits (and costs) of reshoring. Reshoring can simplify supply chains leading to decreased transportation costs, fewer environmental impacts, and reduced overall risk. Reshoring can allow firms to better understand and respond quickly to local demand. However, reshoring can also be associated with higher production costs along with increased exposure to domestic market disruptions [77]. Post-pandemic, we are likely to see companies reassess their supply chains [80]. High value-added firms may shift their resourcing strategies from 'China-Plus-One' to 'Plus China' [81]. However, due to the scale, diversity, quality, and cost-efficiency of its manufacturing sector, China is likely to remain a critical source of imported goods for most companies and countries for the foreseeable future.

Panic or emergency buying demand-driven disruptions. During COVID-19, worldwide markets observed panic buying resulting in shortages of products such as toilet paper, sanitisers, and dried food like rice and pasta. A sudden surge in demand created so-called 'demand risk' to supply chains [82]. Supermarket chains in Australia had to implement restrictions on bulk buying, alter trading hours to restock shelves, and introduce special trading hours for vulnerable populations groups [83]. A research group at UNSW Business School analysed Google search data for 54 countries for January–April 2020 and developed an index of consumer panic. According to this research, Australia was one of the countries most affected by panic buying. Consumer panic in Australia peaked at a level of 0.79 on the index, while in the UK it only reached 0.175, in Italy 0.15, and in France 0.09 [84]. Unlike other countries, the panic in Australia didn't correspond with the number of COVID-19 cases or policy announcements [84, 85].

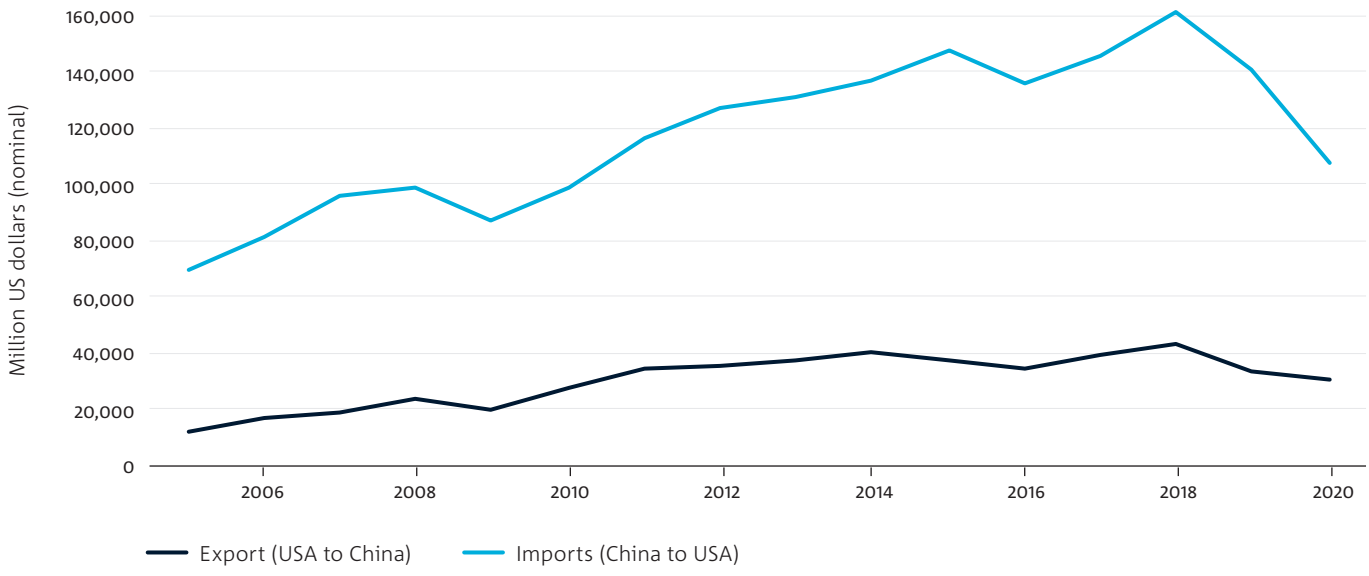

Figure 14. US trade in goods with China in 2005–20 (January–April).

Source: United States Census Bureau [76]

Air cargo volumes have fallen and changed, but less than passenger travel. Cargo tonne kilometres (CTK) flown globally have fallen by 15.2% in March 2020 year-on-year, compared to passenger-kilometres flown, which were down 30% over the same period [86]. There has been a substantial increase in pharmaceuticals and medical products transported via air cargo; pharmaceuticals flown have more than doubled between January and March 2020 [86]. The year-on-year demand for dedicated freight aircraft – as opposed to 'belly-hold' cargo carried in passenger planes – has increased within Asia by over 40% year-on-year. The increase worldwide has been around 5%. By comparison belly-hold cargo has decreased by 35–45% across all world regions [86].

Rising costs and falling capacity for air cargo. The cost of air cargo has risen, partly due to decreased belly-hold capacity. Overall air cargo volumes could fall by 14–31% in 2020 according to industry forecasts [86]. Governments worldwide are working to secure air transport access for their industries [87]. In Australia, a dedicated international freight assistance initiative has been announced to help operating international freight routes and flights until the end of 2020. The initial $110 million program aimed at securing export freight access for agriculture and fisheries exporters while the returning flights were used to bring back vital medical supplies [88]. In July the initiative was extended by an additional $241.9 million to keep routes for high-value, time-sensitive, and perishable exports and vital imports (e.g. medical supplies and essential items) as well as to re-establish domestic connections for regional producers and growers [89].

Global container shipping is down. According to the OECD [90], global container trade volumes declined 8.6% in February 2020 compared to the same month of the previous year. For the entire year of 2020 global freight transport is forecast to be 36% below pre-pandemic levels. Countries comprising the Association of Southeast Asian Nations are forecast to have a 50% reduction in inter-urban (between cities) freight activity and a significant decrease in urban (within city) freight (Figure 15) [91]. Shipping companies have decreased services in response to reduced demand. The COVID-19 situation is already associated with the highest inactive container ship capacity in history. It has been rising since the beginning of the year and reached a record of 524 inactive container ships (around 11.3% of total capacity), surpassing all previous records. The inactive fleet is expected to increase as the pandemic continues.

The shipping industry is cutting costs. Reduced demand and low fuel prices has resulted in the rerouting of shipping traffic. This disruption forced Panama and Suez canal authorities to reduce fees [92]. The Suez Canal Authority announced a temporary reduction of up to 75% of canal transit fees for some container ships [93]. Large sea freight companies have managed to avoid bankruptcy thus far. Most of these companies have been able to achieve positive financial performance due to low fuel prices and well-managed capacity [90]. However, many shipping carrier companies have high debt levels, and there are concerns that a significant number may face bankruptcy and insolvency risks in the near future [94]. This will create pressure on governments for support. According to DHL projections, the sea freight sector will take two to three years to recover to pre-pandemic levels [90].

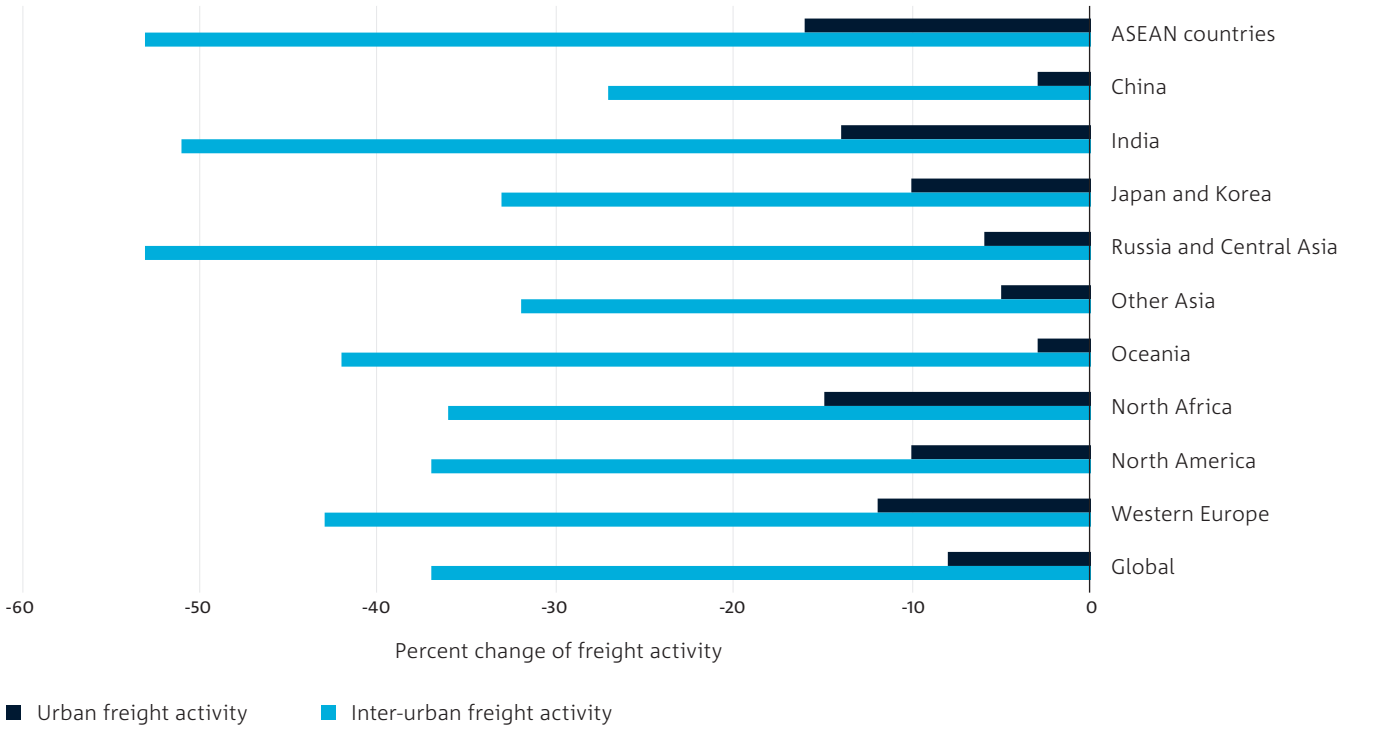

Figure 15. Projected COVID-19 impact on freight for 2020.

Note: Data given for 2020 as percentage change on pre-COVID-19 estimated volumes (by freight type, for selected regions).

Source: International Transport Forum [91]

The search for reliable minerals supplies. The global mining industry is experiencing an unusual combined supply-side and demand-side shock. Some metals such as nickel and uranium have seen substantial production cuts due to regional pandemic control measures [95, 96]. In the case of uranium, expectations of supply shortages created a price spike of 20% in April [97]. Customers buying mineral products from the global mining industry are likely to become increasingly concerned with the reliability of suppliers. Innovations such as mine site automation, remote-controlled drilling, and resilient logistics are becoming more important.

Interest in Australia's mining sector and critical minerals supply. Australian mining companies, especially those involved in critical minerals production, are receiving heightened interest for new, reliable, and secure supply [18, 98]. According to media articles, the US Government has already approached ASX-listed critical minerals mining company Lynas Corporation for a critical minerals supply contract [97]. This is to achieve supply chain security amidst geopolitical shifts and changes in the global trade landscape. Critical minerals include elements such as lithium, cobalt, and many others, which are essential ingredients for a wide range of manufactured goods and technology products. Demand for critical minerals is expected to increase globally. Australia has substantial deposits of cobalt, lithium, and other metals and is well placed to ramp-up the supply into global markets [99]. Australia's unique geology provides critical minerals in relative abundance.

Lost in the mail. Almost every second mail item in the international post system today is 'stranded' as the ratio of mail items exported to items received climbed to 1.8 in April 2020. This is 70% above the level of April 2019. Average customs clearance time for bar-coded parcels increased from 2 hours to 64 hours [100]. According to Australia Post there has been an over five-fold increase in online department store purchases, higher than the Christmas and Boxing Day peaks [101, 102]. These demand shocks coupled with social distancing, hygiene measures, and additional training for delivery staff have transformed delivery processes and increased delivery times [103, 104]. This has exacerbated supply chain reliability problems.

Global food production and trade is contracting but overall, the system is holding up well. The COVID-19 crisis has significantly impacted global food supply chains and there is much uncertainty about future impacts. Overall, the crisis has decreased production and transportation (and trade) of most food groups. Against a backdrop of long-term growth, global per capita consumption of dairy products (–4.9%), meat products (–2.8%), seafood products (–2.4%) and wheat (–0.2%) is forecast to decline between 2019 and 2020. Over the same time period the consumption of coarse grains (+0.3%) and rice (+0.6%) is forecast to rise whilst sugar consumption will hold constant. Global food prices fell during January, February, March, and April this year and returned to growth during June and July. Despite these trends, a recent analysis by the United Nations Food and Agriculture Organization found that 'a COVID-19-induced global food crisis is not on the horizon' and that 'the agri-food sector is likely to display more resilience to the crisis than other sectors' [105].

Australian agriculture and food exporters are experiencing headwinds... The bushfires of 2019–20, followed by COVID-19, have created a challenging environment for Australia's agricultural and food industries. Some of the recent impacts have occurred due to decreased international and domestic flight cargo. This has limited the options for producers and exporters of perishable foods. For example, due to these pressures, Australian fisheries and aquaculture production is expected to decline by 12% in 2019–20 [106]. Further disruptions to agriculture are associated with unexpected trade tariffs imposed by other countries [107] and sudden drops in the availability of harvesting and production visa-reliant workers [108, 109].

... And growth opportunities. At the same time, having faced the turmoil of global supply chains during the pandemic, an increasing number of governments are re-focusing their strategies on national food security and are showing interest in Australian produce. Examples of such governments are Singapore, Hong Kong and the United Arab Emirates. Some liberalisation in international food markets and regulations is also taking place, opening up new opportunities for Australian agribusinesses. Australian producers are actively adapting to changes introduced by COVID-19 by securing new distribution channels, including e-commerce and continually expanding across markets. Innovative traceability solutions adopted by producers and other actors along the supply chain can help further expand export opportunities for Australian agribusinesses within international markets.

Using data science to upgrade supply chain quality, cost-effectiveness, and resilience. Many companies are looking to develop and implement supply chain risk management and geographically diversify their supply chains [110]. Emergence of new information and telecommunication technologies including AI, additive manufacturing (such as 3D printing), 5G telecommunications, blockchain, and Internet-of-Things applications, will improve supply chain reliability. Data science, machine-learning predictive analytics, and multiple-criteria decision analysis technologies are also being applied to appraise and manage supply chain risk. A recent paper in the Journal of Business Logistics [111] and another in the European Journal of Operations Research [82] reviews the current state and future potential of these technologies. There is an extensive body of published research [112] on the use of multiple-criteria decision analysis to rank or score the overall suitability of global and domestic suppliers, taking into account cost, reliability, and quality objectives.

SUMMARY

Capitalising on the safe-haven effect

Even though trade and investment are set to contract sharply over coming months and years, there is an opportunity for Australia to capitalise on the safe-haven effect. In times of global uncertainty, buyers and investors are looking for safety and security. Due to the effective management of the COVID-19 risk, Australia has maintained industry supply chains and a stable economy. This could lead to increased demand for Australian goods and services. Another opportunity relates to the use of data science and decision support to identify supply chain solutions that achieve cost, reliability, and quality objectives.

Megatrend 3

Localisation and staying closer to home

Since March 2020, billions of people across the globe have been living a much more localised existence with movements restricted to their country, region, locality or even home for extended periods of time. Furthermore, images of people stranded in foreign countries – or trapped in quarantined cruise ships – are likely to deter travel. Travel and tourism industry analysts suggest it will take a while for trust to return.

The close-to-home phenomenon extends beyond human mobility to the trade in goods and services. This was apparent in the retail sector for the earlier months of the COVID-19 situation when domestic retail sales were growing whilst international retail sales were contracting. Furthermore, the global trade freeze means that countless products previously imported are no longer available or will experience significant delays in delivery. Business and retail customers – some by necessity and some by choice – turned to local suppliers to get the products and services they need.

In the short-to-medium term, we are likely to see governments and citizens worldwide turn to local options and trusted countries for tourism, manufacturing, and services. There is likely to be a much stronger economic, trade, and cultural connection to local places during and after the pandemic.

The contraction of global and domestic aviation. Global air travel dropped by 94% in April 2020 compared to the same month last year [113]. Data for May 2020 revealed a slight improvement with a 91% year-on-year drop. However, this is mainly due to the relaxation of domestic and intra-Europe air travel restrictions [113, 114]. Passenger flow in Australian airports has substantially decreased**.** For example, Brisbane Airport (Figure 16) recorded a decline in the number of domestic passengers from 1.53 million to 73.5 thousand people between December 2019 to April 2020 [115]. The airport remained open during the crisis, albeit with substantially reduced capacity.

A reluctance to travel. According to the International Air Travel Association (IATA) travellers survey, 58% of respondents stated they would currently avoid air travel, and 33% would avoid travel in future due to COVID-19-related health concerns. Although over 55% of travellers plan to return to family, vacation or business traveling after the pandemic, 66% indicated they would travel less for leisure and business post-pandemic. Furthermore, 64% of respondents indicated they would postpone travel until economic and border conditions improve [116]. The outlook for the future is highly uncertain [113]. The IATA expects air travel demand will not return to 2019 levels until 2023, representing a much slower rebound than for global GDP [117]. Even when the health crisis is contained, and travel restrictions are relaxed, it will take an extended period to restore consumer confidence in air travel and pre-crisis spending patterns [118].

Risk of bankruptcies for airline companies worldwide. According to the IATA, airlines are expected to lose $84.3 billion in 2020. This is equivalent to $230 million lost daily and represents the worst year in the history of aviation (Figure 17)**.** The Asia-Pacific region is expected to face the highest losses [119]**.** The COVID-19 crisis has increased insolvency risks for most airlines with some already declared bankrupt or entering voluntary administration. These include regional operators such as UK regional airline Flybe, Trans States Airlines and Compass Airlines in the USA, Virgin Australia, and Avianca in Colombia [120]. Governments around the world are acting in support of the industry and airlines received US$123 billion of government aid, including US$67 billion in loans. Over 800 thousand airline employees received wage subsidies [114]. Although these actions helped support the aviation industry to address urgent liquidity needs, the airline industry net debt is expected to reach US$550 billion by the end of 2020. This compares to US$430 billion at the end of 2019 [114]. The repayment of debt will prolong the economic recovery of the industry [114].

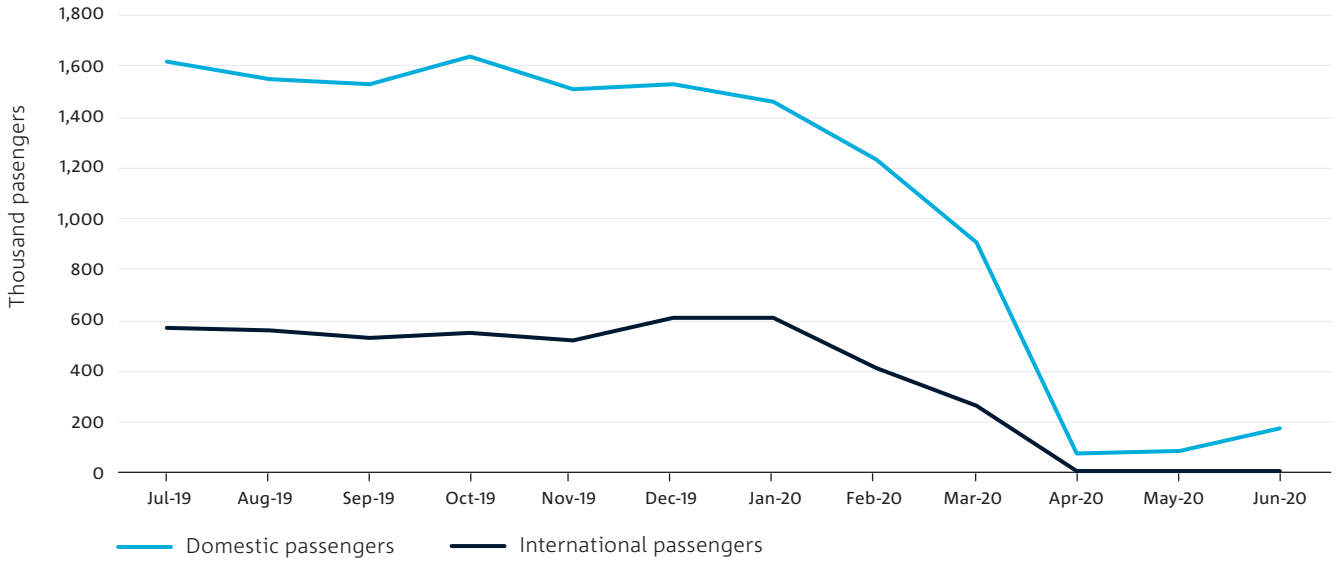

Figure 16. Passenger arrivals at Brisbane airport.

Source: Brisbane Airport Corporation [115]

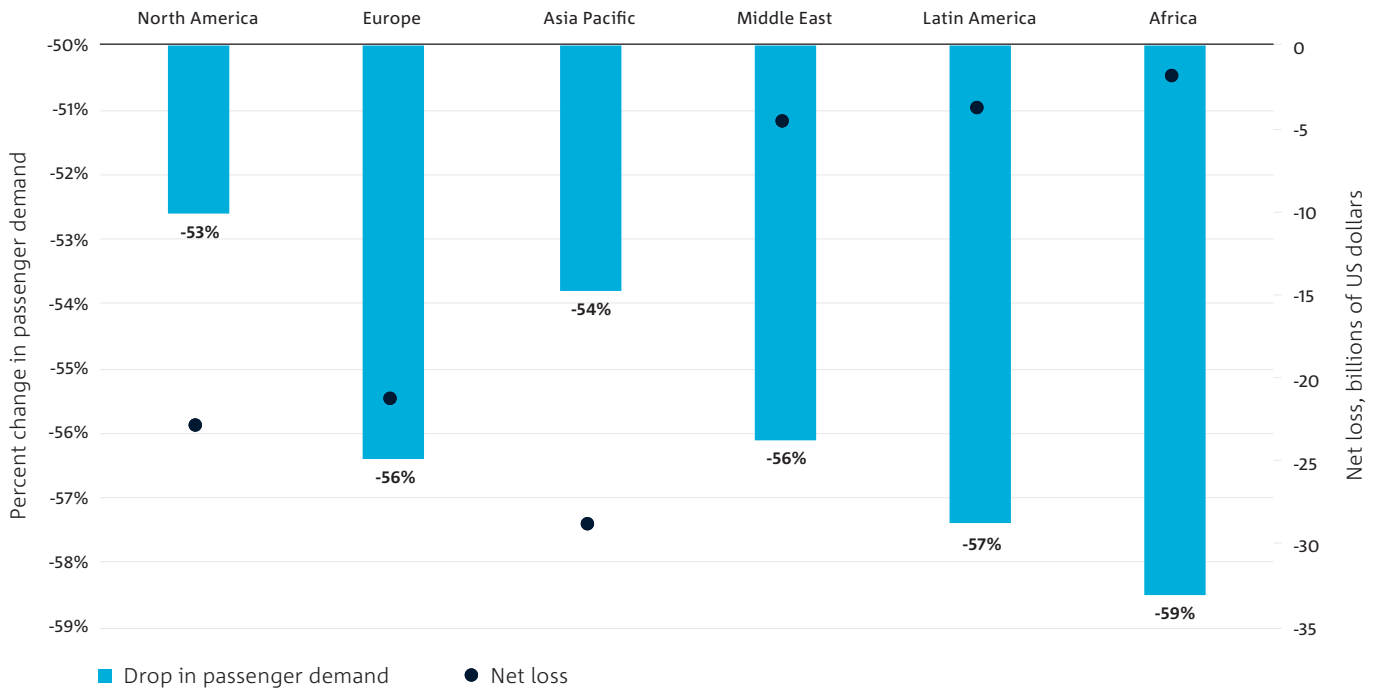

Figure 17. Projected aviation industry performance in 2020 by regions.

Source: International Air Transport Association [119]

Huge losses in international tourism markets. In 2018–19, tourism contributed $60.8 billion to Australia's GDP and provided jobs for 666,000 people, over 5% of the national workforce [121]. The impact of pandemic lockdowns on this industry has been substantial. According to the United Nations, by 20 April 2020 100% of destinations worldwide had introduced travel restrictions. In the first quarter of 2020 international tourism fell by 22%. As restrictions increased in March, tourism fell by 57%, translating into 67 million fewer international arrivals and a US$80 billion revenue loss [6].

... With more acute regional impacts. The Asia-Pacific region observed the highest tourism impact among all world regions, with a loss of 35% of arrivals and 98% of air bookings in the first quarter of 2020 (Figure 18) [6]. According to the US Travel Association, the impact on the US tourism industry is already 6–7 times greater than anything before in history [122]. Globally the decline for 2020 is expected to be 58–78%, which will put 100–120 million direct tourism jobs at risk [6].

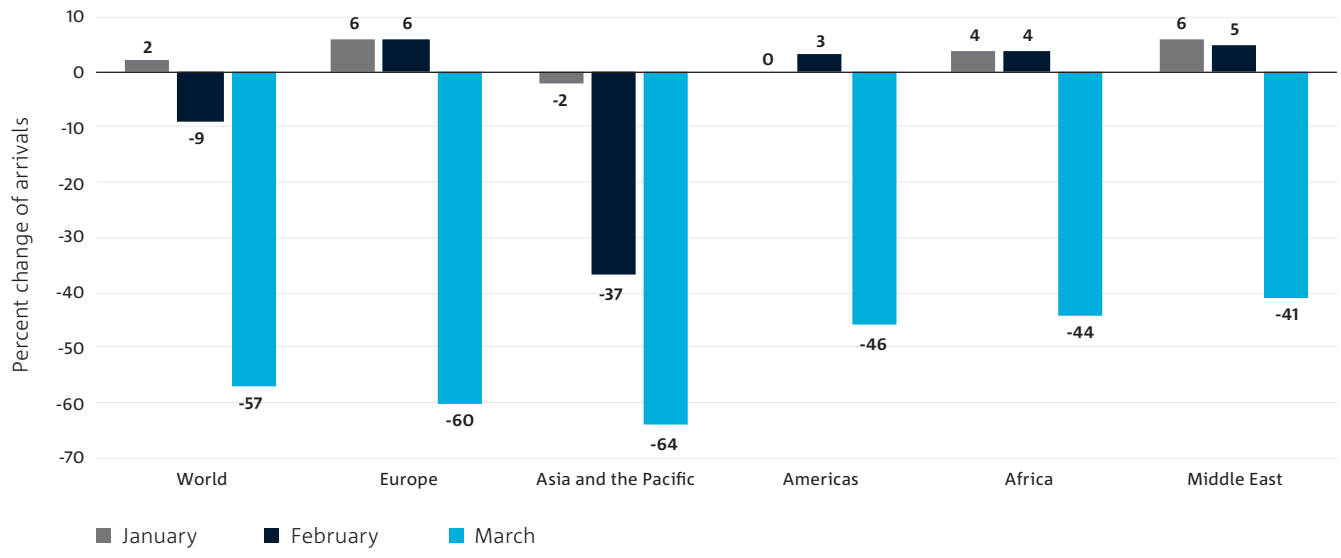

Figure 18. International tourist arrivals in the first quarter of 2020, year-on-year.

Source: United Nations World Tourism Organization [6]

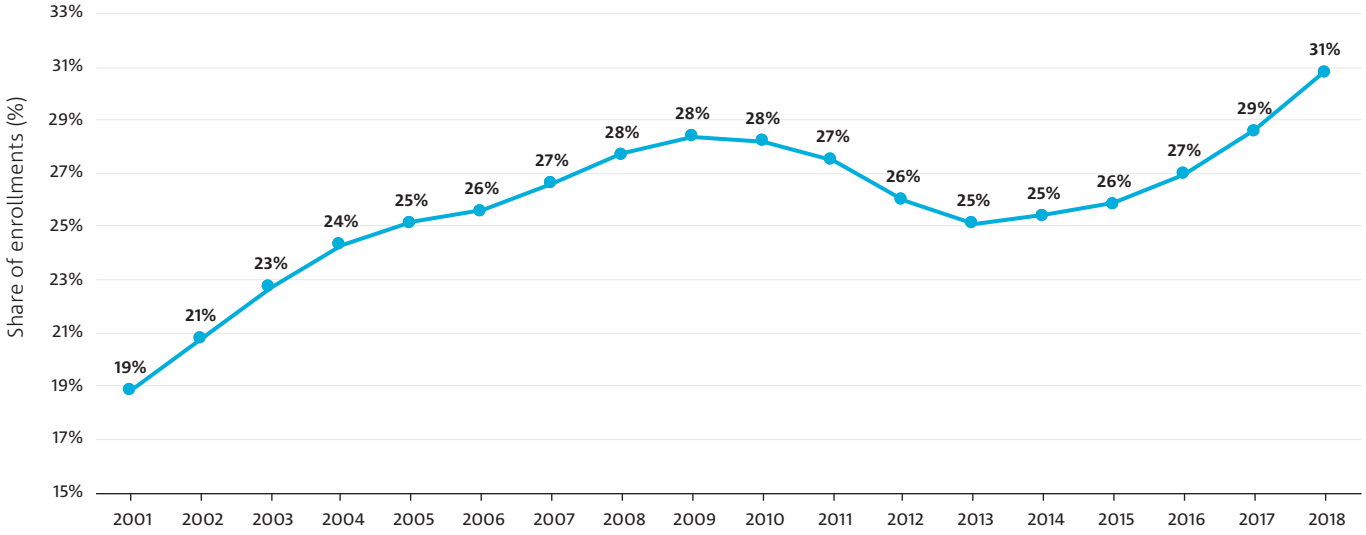

Figure 19. Share of overseas students in Australian higher education.

Source: Department of Education, Skills and Employment

The rising prospects for domestic tourism. The share of Australian household spending on travel has been continually increasing compared to the shares of other items such as clothing, vehicles, and furniture. In 2017 travel accounted for 5.8% of annual household expenditure – up from 4.4% in 2000. Australians spent more on international travel than they did on cars or furniture [121]. Australia is also among the top ten nations globally by expenditure on overseas trips [121]. Domestic tourism is anticipated to recover quickly in Australia and internationally once the health crisis is resolved [6]. However, Australian remote regional destinations reliant on aviation access, such as Uluru, the Whitsundays, Kangaroo Island, Kakadu, the Kimberley, and luxury resorts are yet less likely to benefit from the domestic tourism boom [123].

People want shorter flights. In the future, IATA projections indicate, people will, on average, want shorter flights. Prior to the COVID-19 crisis global average trip lengths for all passenger flights were steadily increasing, reaching around 2,050 km in 2019. However, by April 2020 this had fallen by 8.5% to around 1,900 km [113]. The IATA forecasts average trip length will rise slowly, and by 2025 it is still expected to be considerably less than the 2019 average [124].

Australia's international education sector. According to Universities Australia, in 2018 universities contributed $41 billion to the national economy and supported over 259 thousand full-time equivalent jobs. Deloitte modelling demonstrates that every dollar invested in higher education is associated with a $5 return to Australian GDP, and every 50,000 extra graduates generate an additional $1.8 billion of economic activity or 0.1% GDP growth [125]. The share of international students enrolled in Australian universities has been rising and reached 31% in 2019 compared to 19% in 2001 (Figure 19). Similarly, there has been an increasing reliance on the revenue from overseas students. In 2018, foreign student fees accounted for 26% of total universities' revenue on average, and in some cases, exceeded 35% (e.g. RMIT University, University of Sydney).

The impact of COVID-19 on international education. The COVID-19 pandemic has profoundly impacted Australian tertiary education as overseas students were unable to enrol, or pay fees, this year. Researchers from Melbourne University [8] have identified a number of universities facing high financial risk including the University of Technology Sydney, RMIT, Monash, La Trobe, Central Queensland, Southern Cross and Canberra universities. The crisis is also expected to have a negative impact on future revenue projections for Australian universities. According to Universities Australia, universities could lose $3.1 to $4.8 billion this year and $16 to $18 billion in revenue by 2023–24 [8, 126]. In response to the crisis, the Australian Government introduced the Higher Education Relief package to support the sector and workers looking to retrain [127]. Universities are also re-thinking their operations and re-inventing their business strategies. Collaboration and investment attraction to education and research would be critical for the sector's post-pandemic recovery.

Cruise ship industry impacts. The arrival of passengers from several cruise ships infected with COVID-19 in Australian waters led to some of the largest outbreaks of the virus in Australia. For example, on the Ruby Princess cruise ship alone, 712 passengers and crew tested positive to COVID-19 [128, 129]. Cruise ships are associated with infectious disease-spread risk due to the gathering of diverse populations in close proximity for days or weeks [129]. Furthermore, the movement of passengers at various ports throughout a trip increases the likelihood of spreading infectious disease internationally [130]. However, the cruise ship industry created $5.2 billion in economic benefits to Australia, along with over 18,000 jobs in 2018–19 [131]. The extended downturn of this industry will have significant flow-on impacts on the already impacted accommodation, food, beverage, transport services, and entertainment sectors in Australia [131].

Towards the easing (or tightening) of border restrictions. Australia closed its international borders as a result of the COVID-19 pandemic on 20 March 2020. Tasmania, the Northern Territory, Western Australia, South Australia, and Queensland closed state borders within the next few days [132]. In July, South Australia, Northern Territory and Queensland eased border restrictions except to those travellers from current COVID-19 hotspots such as Melbourne. The resurgence of cases in Melbourne, and now Sydney, after weeks of low national transmission rates, is prompting speculation about a second wave to hit the rest of Australia and the potential impact this will have on recently opened borders and Australia's economic recovery. Over six months into the COVID-19 pandemic, people are still, by necessity and legal requirements, staying closer to home and connected to their local communities.

SUMMARY

The renewal of 'glocalisation' thinking

The term glocalisation is sometimes used to describe the necessity of considering both the global and local context for business and personal activity. Whilst trade has been impacted, it will recover, and trade remains critical for the Australian and global economies. However, COVID-19 has caused much of humanity to increasingly look closer to home for solutions. Business models that respond to this trend will benefit.

Megatrend 4

A changing economic landscape

The world's advanced economies have entered the COVID-19 crisis with record-low interest rates and record-high government debt-to-GDP levels. Many of these economies are also struggling with a productivity slump and growing income inequality. The crisis is also occurring at a time of substantial transformation of banking and finance as fintech, blockchain, and regtech change business models. This megatrend explores the changes in the world economy with implications for a post-pandemic recovery strategy. Australia is well-positioned to translate the challenges of the economic situation into opportunities for growth and access to new export destinations.

Compared to other nations, Australia has done very well in terms of COVID-19-related health impacts. In this environment, Australia might be in a better position to start the economic recovery. Domestic consumption in Australia might also bounce back relatively quicker. Other opportunities associated with this megatrend are chances to attract science and technology talent from overseas; people looking for a healthier and more economically stable place to live and work. Risks are associated with the possible depths of the national and international economic recessions or depressions still ahead.

Record-low interest rates. According to the International Monetary Fund, advanced economies worldwide entered the COVID-19 crisis with interest rates at all-time lows over the past 60 years (Figure 20) [133]. Across advanced economies, interest rates began to fall sharply during the global financial crisis and have remained at low levels through the 2010s.

A debt explosion. National debt started ascending after the global financial crisis, and by 2010 national debt exceeded GDP on average across 35 advanced economies, according to the International Monetary Fund (Figure 21). The USA recorded national debt equivalent to 107% GDP in 2019 while Japan's debt-to-GDP ratio exceeded 240%. Australia entered the COVID-19 crisis in a relatively better position with national debt at 45% to GDP and net debt around 23%, which is still a record high for the nation [99, 134, 135]. Government debts will likely reach new highs post-COVID-19 worldwide. The new debt burdens might take several decades to pay off [134]. The need to continually service public debt exacerbates economic stagnation and is an ongoing hindrance for investment in public services. High deficits and low-interest rates are making the challenge of fiscal and monetary stimulus harder.

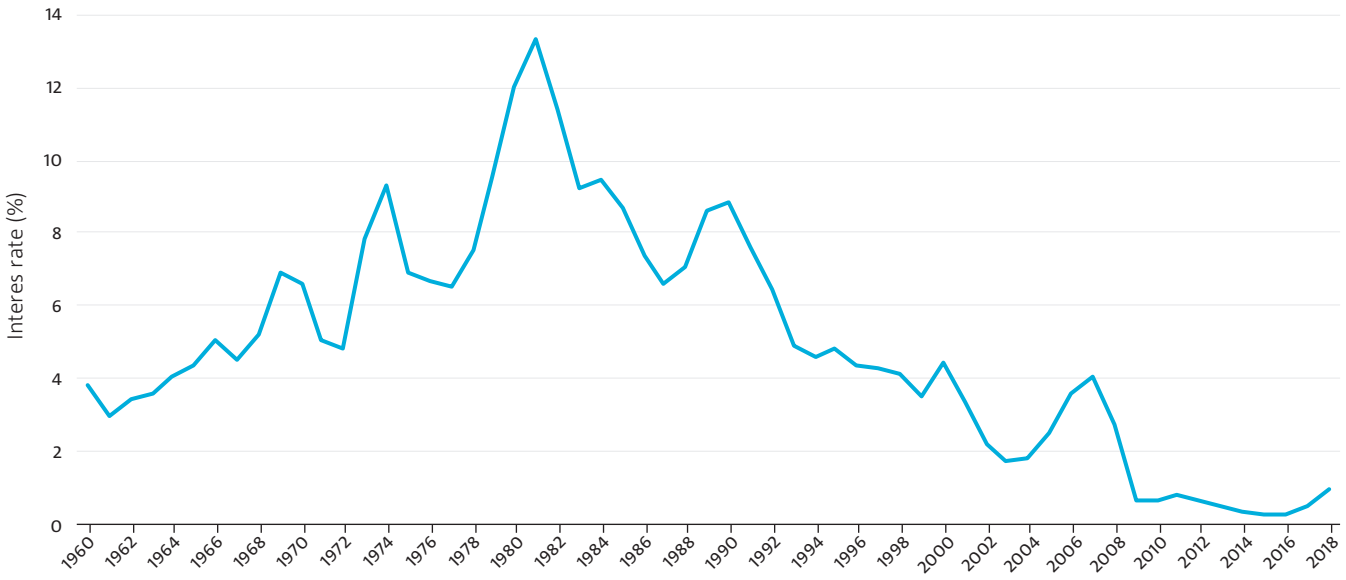

Figure 20. Policy interest rates, weighted average across 35 advanced economies.

Source: International Monetary Fund [133]

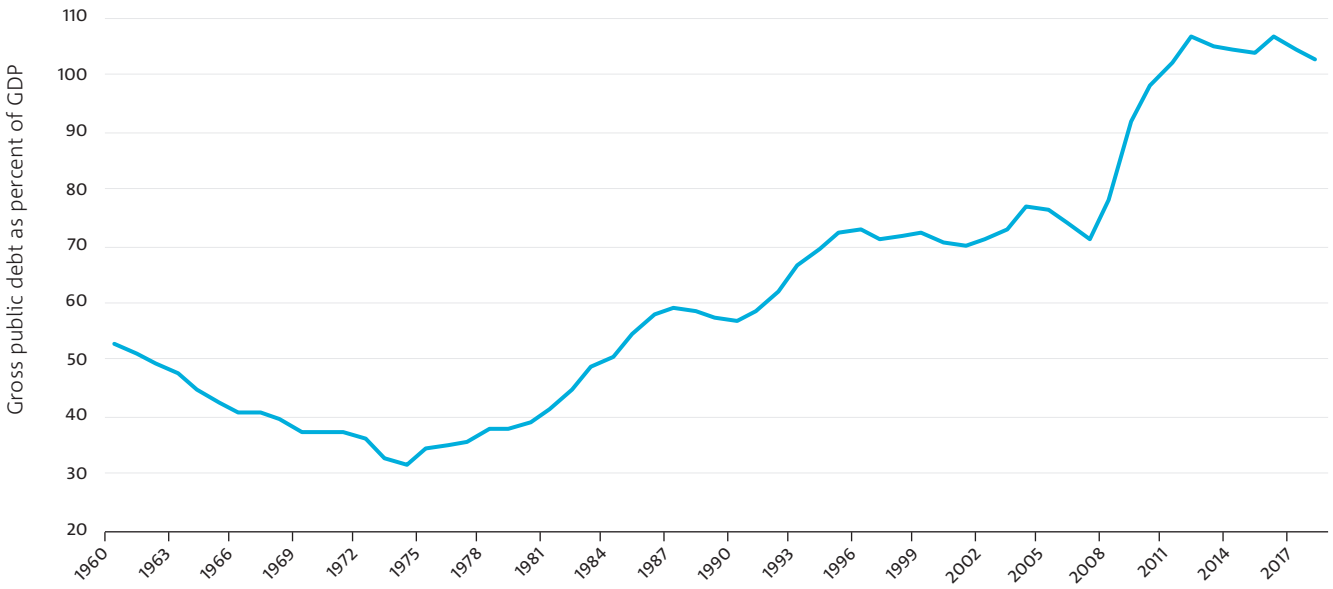

Figure 21. Public sector debt, weighted average across 35 advanced economies.

Source: International Monetary Fund [133]

Rising income inequality. According to the OECD, global income inequality has been growing since the global financial crisis and by 2016 reached record highs in many regions, despite improving employment rates. In Australia income inequality has been relatively stable at an average level across OECD countries [136]**.** While income inequality hasn't changed in Australia, wealth inequality has increased [137, 138]. The COVID-19 economic crisis is unevenly impacting demographic groups and will likely increase wealth inequality in Australia and internationally. In Australia, since the start of the crisis, young people were the most vulnerable to unemployment. Between 14 March and 30 May, employees aged under 20 and 29 lost 16.5% and 12.2% of payroll jobs, respectively (Figure 22) [139].

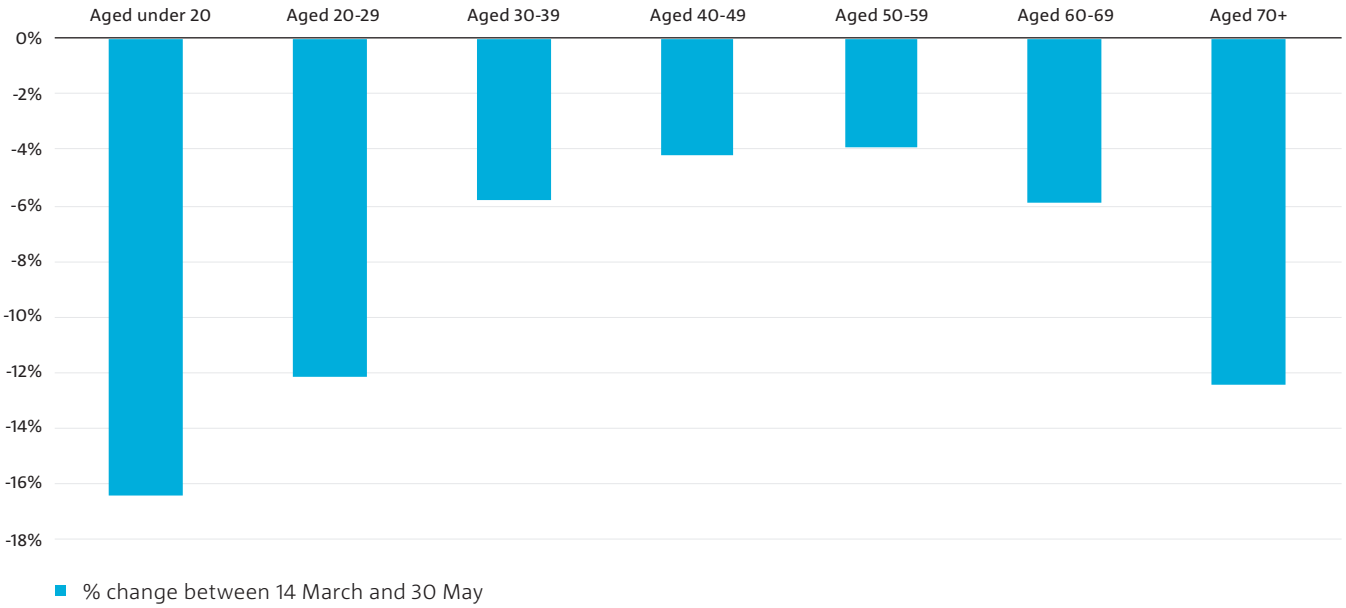

Figure 22. Change in the payroll jobs by age groups.

Note: Data capture change between 14 March (100th case of COVID-19) and 30 May.

Source: Australian Bureau of Statistics [139]

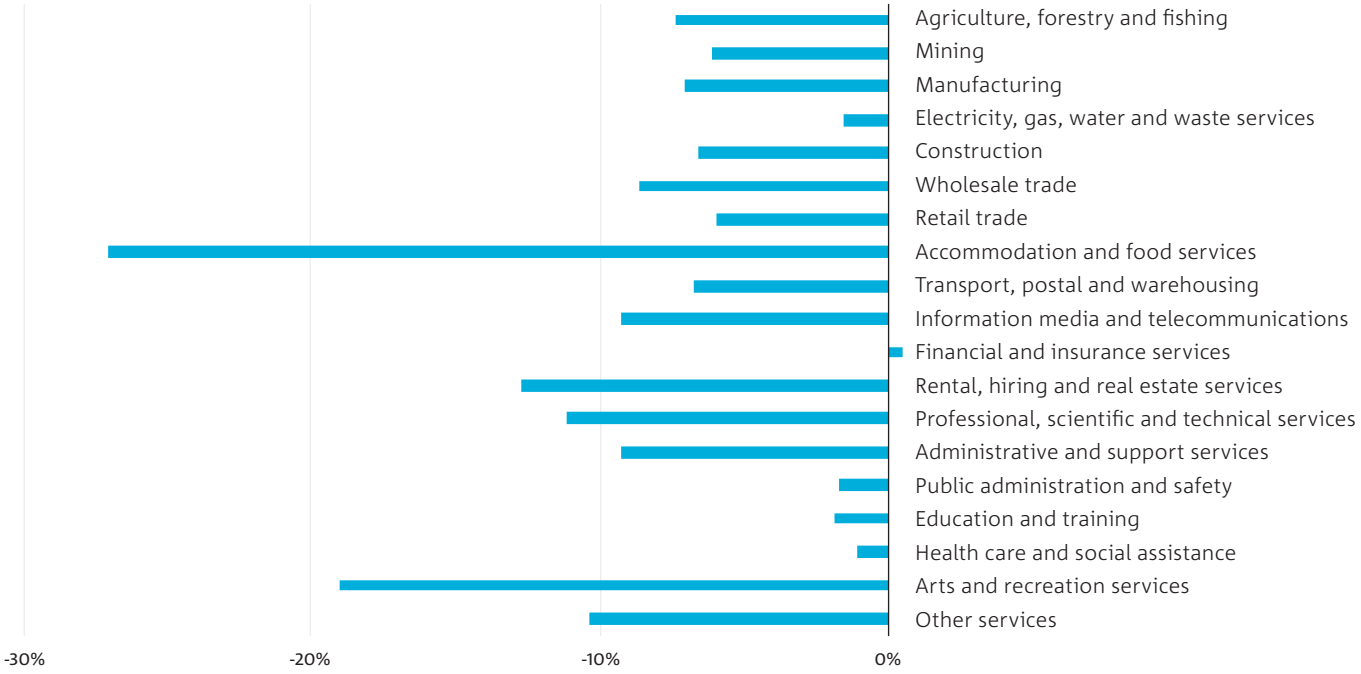

Figure 23. Change in payroll jobs for Australia by industry.

Note: Data capture change between 14 March (100th case of COVID-19) to 2 May 2020.

Data source: Australian Bureau of Statistics [139]

A two-speed global economy and the digital divide. The COVID-19 economic crisis is putting pressure on developing countries reliant on remittances and tourism. These impacts are felt in many of Australia's export destinations. Furthermore, the lockdown and working-from-home arrangements highlight the difference between mobile, technology-connected workers, and those who do not have the same opportunity. The crisis is bringing to the fore the importance of the digital economy and the need to 'bridge the digital divide' in connecting regions and population groups to digital opportunities such as e-commerce [140].

Unemployment is spiking around the world and in Australia. Lockdowns and interruptions to supply chains resulted in growing unemployment in Australia and around the world. According to the International Labor Organization [141], global working hours declined in the first quarter of 2020 by 4.5% or equivalent to 130 million full-time jobs. The decline for the second quarter is expected to reach 10.5% when compared to the last pre-crisis quarter (equivalent to 305 million full-time jobs). The lower-middle-income countries expect to observe the highest losses at –12.5% of pre-crisis work hours. In Australia, between 14 March and 2 May 2020, payroll jobs (Figure 23) decreased by 7.3%, and total wages paid fell by 5.4% [139]. The industries impacted most include accommodation and food services (27% decrease in payroll jobs), arts and recreation services (19% decrease), and real estate related services (13% decrease) [139].

Gender equity gap may deepen post-COVID. Gender equality in Australia has been improving recently. For example, the percentage of women on boards in ASX 200 companies rose from 8.3% in 2009 to 30.9% in 2020 [142]. However, in most fields women are still paid less than their male counterparts. Australia's national gender pay gap is 13.9%, representing a decrease of 0.3% since 2018 (14.1%) [143]. Women were also more likely to be underemployed than men with an underemployment rate of 9.4% compared to 5.6% [144]. COVID-19 will likely deepen gender inequality in Australia (Figure 24). According to the McKinsey Global Institute, greater gender equality in Australia could lead to a 12% increase in GDP by 2025 compared to business as usual [145].

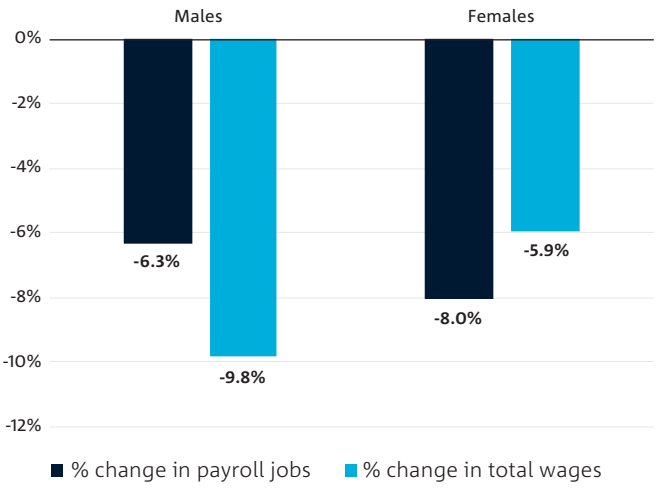

Figure 24. Change in payroll jobs and wages by gender.

Note: Data capture change between 14 March (100th case of COVID-19) and 30 May.

Data source: Australian Bureau of Statistics [139]

Labour productivity growth has also plateaued since the global financial crisis. In 2018 global labour productivity growth was only 1.9%, down from an average annual rate of 2.9% before the global financial crisis.

The ongoing low growth, low productivity trap. Productivity growth is a driving force of long-term economic and income growth. Since 2005 advanced economies globally have experienced a slowdown of productivity growth [146]. The slowdown in Australia has been smaller than in many other nations due to an investment peak over the mining boom in 2012–13. However, since then productivity growth has been weak, and in 2018–19 multifactor productivity in the market sector fell by 0.4% [147]. Labour productivity growth has also plateaued since the global financial crisis. In 2018 global labour productivity growth was only 1.9%, down from an average annual rate of 2.9% before the global financial crisis (Figure 25). In Australia, in 2018–19 labour productivity dropped by 0.2% [147].

Causes and solutions to low productivity. Although there is lack of consensus among economists about the reasons of slowing productivity growth in Australia, the factors that likely contributed were slower diffusion of technology, low investment in knowledge-based capital, increased openness of the economy, lack of job switching by workers, and new managerial practices outside the mining sector [147-149]. Slowing productivity growth, including labour productivity, was a cause of concern prior to COVID-19, and is now becoming alarming as the economic crisis unfolds in 2020. Strengthening of productivity performance is desirable for Australia in helping to recover from the COVID-19 crisis and in the broader response to the forthcoming challenges and fiscal pressures of an ageing population and climate change [148, 150]. Important drivers of labour productivity growth could be investment in technology and adoption of innovation, productivity-enhancing structural reforms, access to and encouragement of lifelong education, and upskilling.

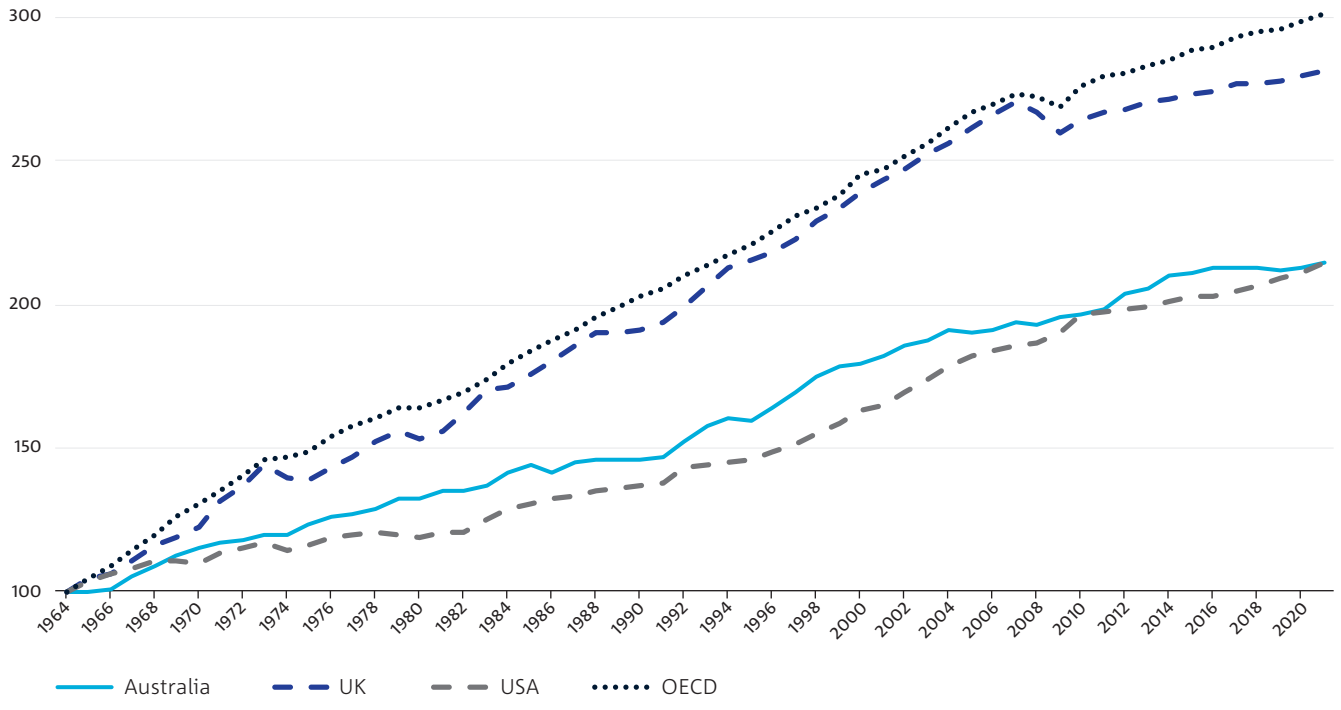

Figure 25. Labour productivity growth in Australia and selected countries.

Note: Includes historical and forecast estimates.

Data source: Organisation for Economic Co-operation and Development [146]

COVID-19 is accelerating the rise of trade tariffs and distortions. The last decade has seen a slowdown in trade integration globally. According to the Global Trade Alert, in 2018 over 50% of G20 exports were subject to trade distortions [151]. In the services sector, the OECD's Services Trade Restrictiveness Index recorded a 30% increase in tariff and non-tariff barriers to trade in services in 2019 compared to a year before [152]. Since the beginning of 2020, trade distortions are accelerating – additional export and import control measures in critical supplies such as food and medical products introduced by dozens of jurisdictions globally (Figure 26) [153].

The impacts of trade distortions. Although protectionism measures during the crisis are aiming to protect local producers and consumers, there are long-term effects of trade distortions and trade tension which would likely last post-pandemic. Increased protectionist sentiment could reduce global growth and productivity growth, curb investments and reduce business confidence, depress wages, increase unemployment, and hamper efforts to reduce poverty [154, 155].

The benefits of trade liberalisation. According to modelling by the Bank of France [156], a 10% rise in import tariffs can reduce global real GDP by up to 3% in two years. For Australia, according to the United States Studies Centre at the University of Sydney [157], engagement in international trade is critical and a 1% increase in Australia's economic globalisation score could raise Australian labour productivity 0.3%. Researchers also report that Australia could gain 5–9% in productivity by matching the level of globalisation of other economies such as Germany, the UK, and Singapore [157].

A corporate credit and liquidity crisis is deepening. The corporate debt-to-GDP ratio in advanced countries has been increasing since the 1980s. In Australia corporate debt peaked in 2008 at 83.5% of GDP and remained high for the next decade (Figure 27) [158]. Prior to COVID-19, low-interest rates were already encouraging investment in risky illiquid assets. By 2019 the vulnerability among nonbank financial institutions to declines in operating earnings grew to the highs observed during the global financial crisis [159, 160]. The COVID-19 crisis and the recession are increasing competition for capital and will likely push corporate debts to new highs, increase vulnerability, create a wave of insolvencies, and a future credit crisis that extends beyond the initial economic crisis. Central banks around the world take actions, including through open-market operations, loans, and asset purchases, to provide additional liquidity to the financial systems and preserve their stability [161]. However, in the current economic recession, the deepening corporate credit and liquidity crisis could amplify unemployment and further reduce investment if companies default on their debt obligations [159].

Fintech disruption is expanding with clear export opportunities ahead. Financial technology (fintech) has been a recent driver of innovation in commerce and trade. KPMG reports that in 2019 global investment into fintech reached US$135.7 billion [162]. Australia has been an early and eager adopter of fintech, including both PayWave and mobile payments – between 2015 and 2019 fintech adoption in Australia grew from 13% to 58% [163]. Fintech Australia reports that Australian fintech has grown from a $250 million industry in 2015 to over $4 billion by 2020 [164]. In 2019 the first Australian fintech start-up, Airwallex, achieved unicorn status, exceeding US$1billion

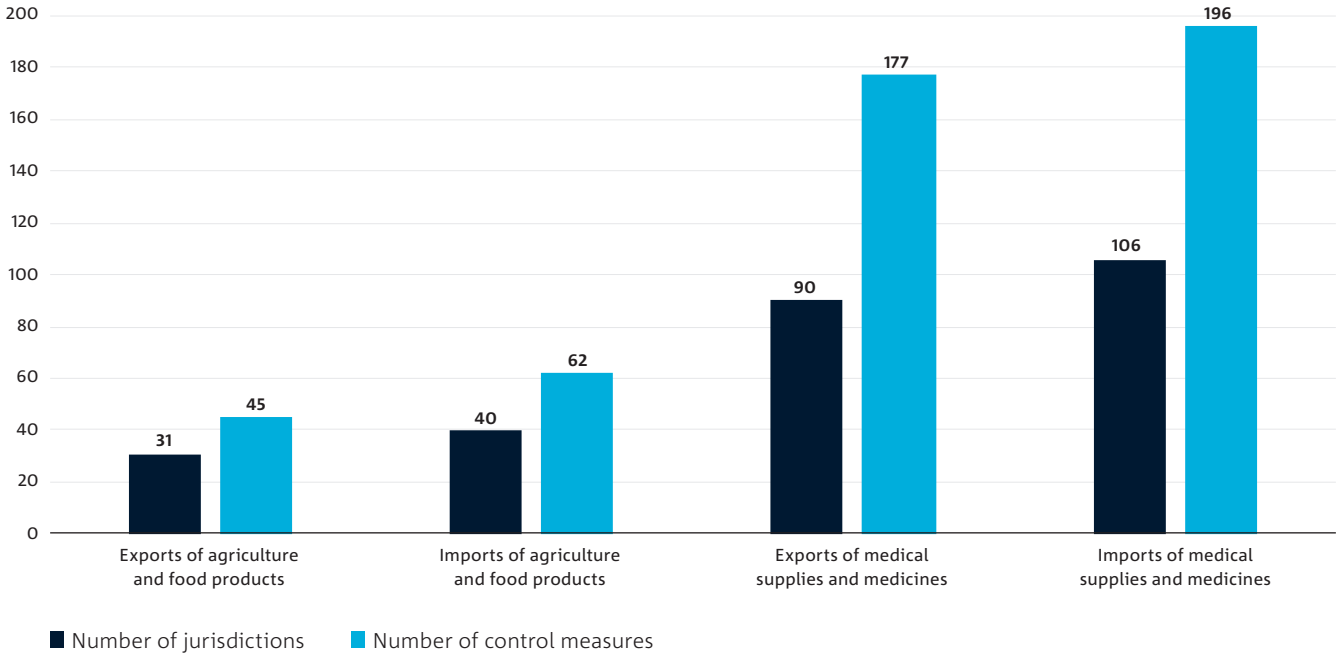

Figure 26. Export and import control measures towards food and medical products.

Note: Captures measures executed between January and June 2020.

Source: Global Trade Alert [153]

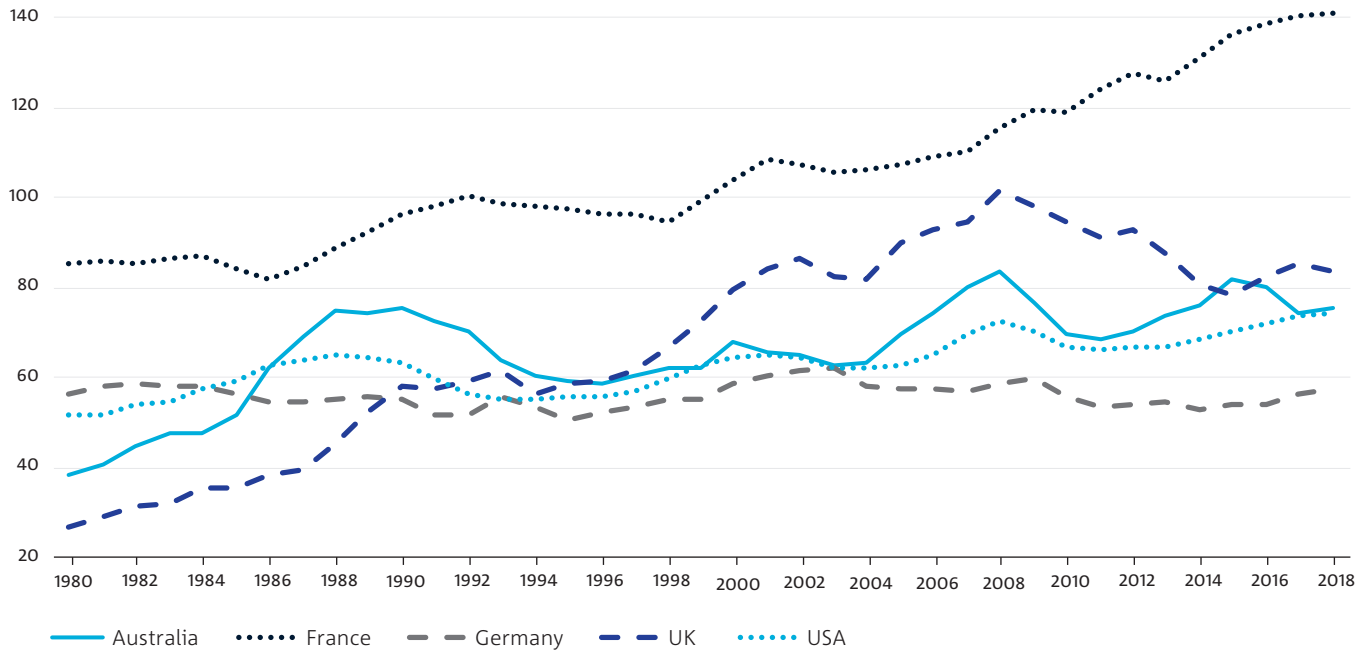

Figure 27. Total debt of nonfinancial corporations as a share of GDP.

Note: Data capture the stock of loans and debt securities issued by non-financial corporations.

Source: International Monetary Fund [158]

in valuation [165, 166]. Australia also welcomed a rapid growth of neobanks in 2019, heating up the competition in the financial sector [167]. Neobanks are digital-only banks with nimble structure, allowing them to be more flexible and responsive to customer needs. Australian neobank Xinja alone reached $100 million in deposits only 19 days after it launched its saver's account and $200 million in less than a month [168, 169]. However, it has been the emerging markets that are ahead of the world in fintech development and adoption. According to Ernst & Young's Global Fintech Adoption Index [163], the world leaders in consumer fintech adoption are China and India, with adoption rates of 87%, compared to 58% in Australia and 46% in the USA. The 2020s would likely see further adoption and innovation of fintech in the developing and unbanked markets of Africa and the Asia-Pacific as well as growth of neobanks. With open banking launching in Australia in 2020, we are likely to see a further change in consumer preferences around banking, investing and insuring, and further technology innovations. It also means that financial institutions would need additional cybersecurity systems and solutions in place to mitigate emerging cybersecurity risks [170, 171].

Foreign direct investment will be critical for recovery. Australia's ability to attract investment helps keep the economy on strong foundations, including its resources and talent [99]. Australia's level of FDI exceeded $1 trillion at the end of 2019; over 2009–19, FDI stock in Australia was growing at a compound annual rate of 7.6% [99, 175]. Australia was the eighth-largest recipient of FDI worldwide in 2018 and thirteenth in 2019. The two most significant investors in Australia are the US and the UK [176, 177]. Before the pandemic, global FDI growth had slowed due

Emerging high-tech solutions in Australia could catalyse recovery. According to the Export Council of Australia [35], digital goods and services made up $6 billion of exports in 2018, making it Australia's fourth-largest export sector. This could more than double to $19 billion by 2030. High-tech such as data analytics and AI are already foundational to ecommerce, banking, government, and advanced manufacturing in Australia. They are applied to improve decision making, enhance customer targeting, and increase operations efficiency. Australia has global AI advantage capability in health and biotech, infrastructure and urban management, and agriculture and resources [172], which could be further built upon to expand into the post-pandemic export markets. Other high-tech solutions with growing export opportunities, where Australia has a competitive advantage, include regtech and blockchain [99]. Australian researchers and startups are at the forefront of blockchain development and adoption and many world-known blockchain trials took place in Australia, including in energy trading, smart contracts, water, intellectual property (IP) rights, and digital identity, among others [173]. High-tech industry is quickly evolving and provides market solutions for enhanced productivity, transparency, provenance, and compliance. However, there is room to do more to take advantage of this capability in the post-COVID-19 global economy [172, 174].

to the risks presented by trade wars and a political turn towards protectionist policies. The response to the pandemic forced many national governments, including Australia's, to review and temporary restrict foreign investment rules due to increased risks to economic security and the viability of critical sectors. However, since the start of the crisis, the vast percentage of investment applications in Australia, reviewed by the Foreign Investment Review Board, were approved, and Australia remains open to investment [178, 179]. FDI will be important for Australian recovery post-pandemic as Australia continues to offer a safe and stable environment for international investors beyond 2020 [176].

The (incredible) ability of the US economy to bounce back. Fears of a 'US decline' have been a consistent narrative almost since its founding [180, 181]. However, the USA's capacity to innovate has been the source of their prosperity and strength. Their unique drive, audacity, and grit mean that the US economy can renew and rally. The USA remains a powerhouse of R&D and commercialisation. According to the World Economic Forum [182], the USA was the world's first most competitive economy in 2018 and second in 2019. The USA ranks first for scientific publications, first for business dynamism, first for venture capital availability, and second for innovation capability. US venture capital deal value reached US$137 billion in 2019, down slightly from a peak of US$140 billion in 2018, surpassing the all-time highs of the dot-com era of the 2000s (Figure 28) [183, 184].

The ability of the world economy to bounce back. The recovery from the pandemic and resulting economic crisis may be more prolonged than initially hoped. However, we may be able to draw lessons from history. The 1920s began with the world recovering from a war, the Spanish flu pandemic, and a depression. However, it later emerged as a time of prosperity, rising incomes, and innovation, with antibiotics, electric light, telephones, and radio coming to consumers and making life profoundly different to a decade earlier. The 2020s might see similar changes with quantum computing, energy storage, AI, blockchain, and molecular biology. Emerging technologies today have the potential to boost economic and productivity growth in Australia and internationally.

The economic potential frontier technology. According to PwC estimates [185], taking advantage of the implementation of AI alone can contribute up to US$15.7 trillion to the global economy in 2030 (14% of global 2017 GDP), of which 55% could come from increased labour productivity. According to CSIRO research, since 2000 Australia has only captured 7.4% of the economic value from digital technology compared to 11.2% captured in other similar advanced economies [186]. Further automation could increase Australia's productivity and national income – adding up to $2.2 trillion to the economy by 2030 [187]. To achieve the 'roaring 2020s', societies would need to take advantage of new technology shifts and promote diversity and inclusion. Such transformation would change work and skills compositions and would require targeted investment in R&D, education, and technology adoption.

SUMMARY

The era of economic recovery

A generation of Australians will train, work, and live in an economy primarily concerned with rebuilding and recovering from the COVID-19 shock. This will characterise government policy and industry strategy. Even though the economic conditions are extremely challenging there are good reasons why the Australian and global economies can bounce back. We can achieve the roaring twenties again in the 2020s.

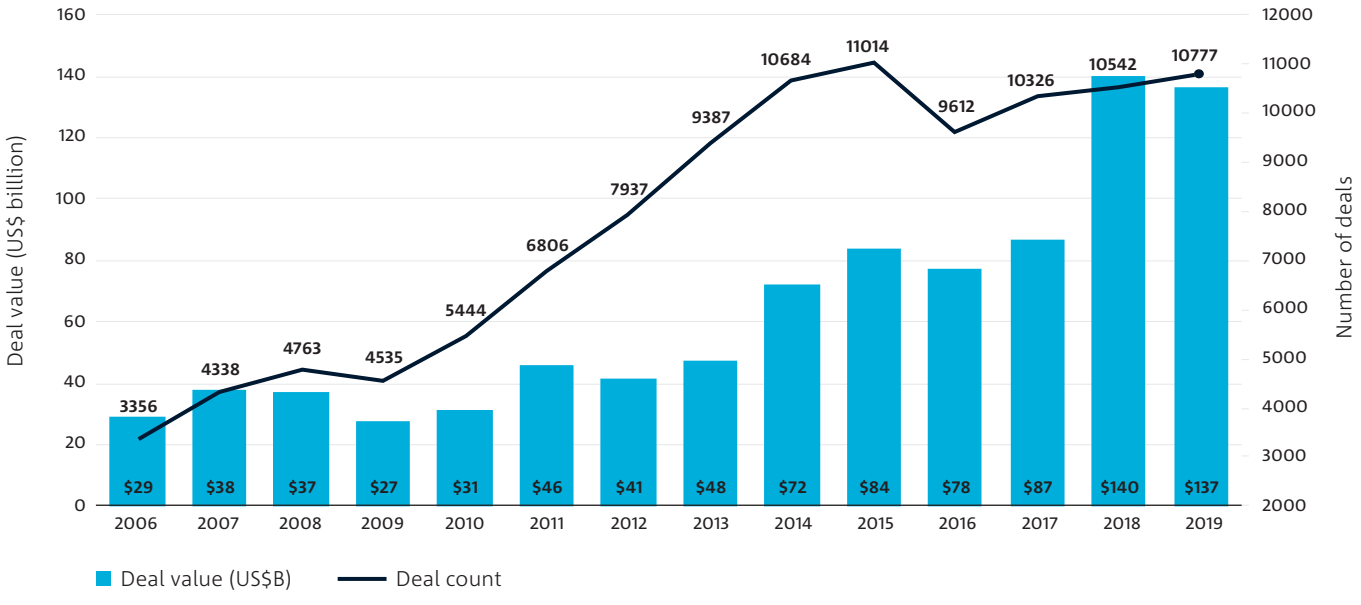

Figure 28. US venture capital activity by deal value and count (as of 31 December 2019).

Source: PitchBook [183]

Megatrend 5

Stepping into the new normal

The phrase 'turbulent, uncertain, novel, and ambiguous (TUNA)' was proposed by strategic foresight experts at the University of Oxford Said Business School to describe today's business landscape. The TUNA concept is useful as we look towards a global future with elevated infectious disease, climate change risks, and geopolitical shifts.

Following the disruption caused by a devastating 2019–20 summer bushfire season, the global COVID-19 pandemic, escalating cyber attacks, and rising international tensions, a 'new normal' has entered the lexicon to describe Australia's immediate future. While the future may look bleak with rising unemployment, restricted social and recreational activities, and economic challenges, such large-scale disruption provides the opportunity to shift the status quo in more positive directions.

Harnessing these opportunities and avoiding a return to the 'old normal' will be key in determining Australia's recovery over the next several years in the new TUNA reality.

Between February and April 2020, the number of short-term arrivals to Australia dropped by 78% from the same period in 2019.

The escalating infectious disease risk – we need to prepare for the next COVID-19. The infectious disease risk is likely to escalate into the future [188] with zoonotic diseases – infections transmitted from wild and domestic animals to humans – the most rapidly growing disease type [189, 190]. The last two decades have seen SARS (2003), H5N1 (2005), H1N1 (2009), Ebola (2012), MERS (2015) [191-194], and now COVID-19 [195]. The rising infectious disease risk results from the world's increasing population, human mobility, jet travel, tourism, livestock production, animal handling, zoonotic pathogens, and urbanisation [188, 196, 197]. Without concerted global investment in comprehensive early detection and response measures the world is likely to experience future outbreaks and pandemic events with increasing frequency and severity [198]. Australian organisations will need to factor-in the increased risks of infectious disease outbreaks and pandemics as they rebuild trade connectivity to the world.

The unabated threat of antibiotic-resistant bacteria. Due to the overuse, and incorrect use, of antibiotics/antimicrobials for human healthcare and livestock production, some species of bacteria have developed resistance. A recent report by the World Health Organization [199] identified antibiotic-resistant *Acinetobacter baumannii, Pseudomonas aeruginosa* and various Enterobacteriaceae as the three most 'critical' threats to humanity. The report identified an additional six bacteria species as 'high' risk and another three bacteria species as 'medium' risk. The United Nations estimates that, if left unchecked, antibiotic-resistant bacteria could cause 10 million deaths annually, costing US$100 trillion by the year 2050 [200]. The International Federation of Pharmaceutical Manufacturers and Associations (IFPMA) estimates [201] that already 700,000 people die each year due to antimicrobial resistance (AMR).

The slow-down in antibiotic discovery. In addition to the growing number of drug-resistant bacteria is the slow-down in antibiotic discovery. Since 1980 there have been no new classes of antibiotics developed by the world's pharmaceutical sector. To tackle the problem, the recent launch of the US$1 billion AMR action fund by IFPMA this year aims to bring two to four new antibiotics to patents by 2030 and to develop market conditions for sustained investment in antibiotic development [202]. This represents an extremely valuable yet challenging, scientific, and technical program of work. While the COVID-19 virus is currently occupying news headlines, the threat of AMR is also part of our new normal.

A changing climate. The growing scale of economic activity across the globe relates to a direct increase in greenhouse gas emissions and a changing climate [203]. As a result of the economic downturn and restricted local and international movement due to COVID-19 there was a 17% reduction in global CO_2 emissions in April 2020 compared to average 2019 levels [204], however, the emissions level is expected to rebound as the world returns to normal post-pandemic. Significant Australian export sectors, including agriculture, forestry, and fishing and tourism are sensitive to changes in climate and will be negatively impacted by increasing extreme and variable weather patterns [205]. At the same time, the changing climate and its impact on agriculture, forestry, and fisheries industries around the world could drive greater opportunity for exports of the Australian digital and science-based ag-tech innovation solutions.

A world with more travel restrictions. Over the past several decades national borders have become increasingly porous along with a pattern of escalating human mobility across the globe [206]. Prior to COVID-19, most people took for granted the ability to travel between countries at relatively low cost. Although this mobility helped spur a golden age of trade, it has also lead to an accelerated transfer of microbes and infectious disease across the globe [207]. Following the global COVID-19 outbreak, international travel has shifted from a surge to barely a trickle and is looking to continue that way until a vaccine is developed and made accessible [208]. Many borders have been substantially shut-down and are harder to cross. Between February and April 2020, the number of short-term arrivals to Australia dropped by 78% from the same period in 2019 [209]. Even with a vaccine available, there is some doubt about a return to the status quo with a new focus on more resilient supply chains and, in turn a movement away from just-in-time and geographically concentrated supply chains [210]. The development of travel bubbles and corridors to help mitigate the re-emergence of community transmission of COVID-19 could have significant impacts on both the flow of goods services and key people [211, 212].

By mid-2020, Australia had sustained a most significant, co-ordinated, cyber targeted attack, with a 330% increase in attacks from the start of the year.

Cybersecurity risks and online manipulation are on the rise as the lockdown world goes digital. Over the past several decades international trade has become increasingly enmeshed with digital technologies that both support and enable trade (e.g. logistics and communication) as well as provide a growing market for ICT products, services, and data flows. As a result, data protection and awareness around cybersecurity and the risk of cyber-attacks have emerged as critical considerations [213]. This shift has been compounded by the COVID-19 pandemic, which rapidly accelerated the digitisation of businesses with workplaces shifting to working-from-home arrangements and a skyrocketed increase in online shopping [214]. Our reliance on digital systems increases not only our vulnerability to cyberattacks but the scale at which they may cause damage. By mid-2020, Australia had sustained a most significant, co-ordinated, cyber targeted attack, with a 330% increase in attacks from the start of the year [215, 216]. The Australian Government has responded to increasing cybersecurity risks with the International Cyber Engagement Strategy [217] and the establishment of the Australian Cyber Security Centre. However, the rapidly changing international digital environment requires continued development of proactive and responsive systems to maximise the opportunities for digital trade and the use of supportive cyber-safe digital systems.

Population ageing will impact trade and investment. Empirical research demonstrates that differences in demographic composition across countries affect international trade flows [218]. Population aging is a global phenomenon and a megatrend reshaping the socio-economic facets of many developed economies, including Australia [219]. Between 2019 and 2050 the number of people aged over 65 is expected to more than double across the globe [220]. Although Australia is in a comparably favourable position among other OECD countries, due to relatively high fertility rates and net migration inflows [221], population ageing remains a big challenge with profound implications that call for policy responses. In 2017, 21% of Australia's population was aged 60 and over; this is expected to increase to 26% of the population by 2066 [222]. This projection does not consider changes to migration in a post-COVID-19 environment, which could hasten population ageing. Without major shifts in policy and labour markets, an ageing population could lead to reduced labour productivity challenging Australia's competitiveness in global markets.

Between 2019 and 2050 the number of people aged over 65 is expected to more than double across the globe.

The continued trend towards urbanisation. Urbanisation is occurring rapidly across the globe and if not planned for and managed effectively, can lead to significant environmental and social problems [223]. On the other hand, when managed well urbanisation can lead to productivity growth, high employment rates, and wealthier populations [224, 225]. The development of well planned, technologically enabled smart cities will help minimise challenges and ensure that opportunities are realised [223]. An important feature of smart cities is the ability to respond to changing circumstances. Around the world, the impacts of COVID-19 lockdowns have created greater demand for walking and cycling paths as other recreational and health activities are temporarily off-limits [226]. Cities in Europe, the UK, the USA, and New Zealand have used pop-up bike lanes that take the road space and turn it into footpaths and bike lanes overnight to meet the needs of their residents [227, 228]. Australia is investing in the development of smart cities both nationally and within the Asia-Pacific region [229, 230] to promote the development of connected and sustainable cities that strengthen collaboration, productivity, economic activity, and provide a stronger trade environment.

Fewer road accidents and deaths during the COVID-19 shutdown period. According to the Australian Government [231] there were 75 deaths during April 2020 on Australian roads which is 25.3% lower than the average for April over the past five years. This is likely to be a consequence of decreased vehicle usage. In California a study by UC Davis [232] revealed that traffic collisions and fatalities across the state dropped by 50% in the first three weeks of the COVID-19 shutdown. Fatal and/or injury crashes were down from 1,000 per day to 500 per day. The reduced crash rate resulted in savings of US$40 million per day or US$1 billion since the restrictions were introduced. Traffic volumes were 55% lower on highways.

Towards a world with less conflict. Despite the news headlines, and the highly consequential strategic geopolitical environment characterising our time, the data show global armed conflict is decreasing over the longer term. This was shown in a recent empirical study published by the USA's RAND Corporation in 2017 [233]. Looking at almost three decades of data since 1990, RAND researchers concluded that armed conflict 'has decreased [and that] interstate war has become a rare event, and intrastate conflict has lessened in frequency and magnitude' (page 1). The researchers also found that peacekeeping coalition defence forces – that are ethical, highly capable, and effective – act as a deterrent to conflict and contribute to regional peace and stability.

More trade, less conflict. Another study, by researchers at Stanford University [234], of global conflicts between 1820–2000 found that 'increased trade decreases countries' incentives to attack each other and increases their incentives to defend each other, leading to a stable and peaceful network of military and trade alliances that is consistent with observed data'. The researchers found that the number of wars per pair of countries during 1950–2000 was 10% of the number of wars between pairs of countries during 1820–1949. The best explanation for this decrease in armed conflict, identified by the researchers, is increased international trade.

SUMMARY

The need for anticipatory governance and foresight

The COVID-19 crisis is occurring against a backdrop of significant environmental, economic, technological, social, and geopolitical change. As we enter the new normal, we need an increased ability to see what's coming and reset strategy to take advantage of new sources of opportunity and mitigate new sources of risk.


EUR / USD
Balance:
5.33456778
$ 23987.66

4 Strategic actions

Stemming from the megatrends, we identify several strategic actions to deliver against the core purpose of the Australian Trade and Investment Commission (Austrade) of 'connecting Australian businesses to the world and the world to Australian businesses'. These actions aim to attract investment into Australia and connect our companies to export markets with strong growth potential. This will lead to increased economic growth and job creation for Australians.

These strategic actions were stress tested via two consultative workshops delivered online during late June 2020 and jointly hosted by CSIRO and Austrade. Each workshop had around 35 guests. Most had industry backgrounds with others attending from research organisations and universities.

The workshops involved a presentation on the megatrends; about how the global trade and investment landscape may unfold during and after COVID-19. This was followed by a session about actions for Australia to harness opportunities and mitigate the risks of significant shifts.

These discussions formed the basis for the research team to draft and progressively refine a set of strategic actions as discussed in this section of the report.

Strategic actions

1. Developing data-driven trade and investment
2. Boosting digital exports
3. Developing a refreshed and expanded R&D investment attraction program
4. Delivering on the perception and reality of the world's safest holidays
5. Building a pandemic-proof international education sector
6. Boosting Australia's critical minerals exports
7. Expanding food, agricultural and agri-tech exports
8. Developing an export-earning disaster-resilience technology industry
9. Developing trade and investment foresight capability

Action 1

Developing data-driven trade and investment

This strategic action involves the strengthening of advanced data-driven technologies to inform trade and investment decisions. These approaches are increasingly being used by trade and investment corporations worldwide. Some of the many data science and related technologies being used include:

1. Machine learning – This field of research is concerned with the development of computerised algorithms to identify patterns, make predictions, and automate tasks without explicit guidance. Machine learning typically requires large volumes of training data. It could be used to identify growth opportunities relating to investment and trade based on recent patterns of activity and historical data.

2. Predictive analytics – This involves the use of statistical techniques, mathematical modelling, and sometimes machine learning to forecast future trends and events. Predictive analytics can be used to quantify risk and uncertainty relating to future trade and investment opportunities.

3. Operations research – This is a branch of mathematics aiming to help decision makers identify optimal solutions to a wide range of business and planning problems. Operations research can be used to identify the best supply chain solutions which minimise costs and/or maximise returns for companies.

4. Natural language processing – Much of the information about future foreign direct investment (FDI) and export opportunities is human langauge captured in textual form. Company annual reports, for example, written by humans may signal future investment intentions. Natural language processing can be used to autonomously read and analyse large volumes of text about company investment intentions.

5. Decision support technologies – These technologies draw upon the outcomes of other data science tools and merge them with information drawn from experts to help people make decisions, and handle trade-offs, about where the highest priority opportunities exist. Decision support synthesises vast quantities of information arising from statistical forecasting, machine learning, natural language processing, and other sources into formats suitable for human decision making.

Growing these technological capabilities ensures that Australia remains competitive in the global marketplaces for trade and investment. We note that these tools are already being tested and used in Australia. There is substantial scope for future upgrades. The biggest challenge has typically been obtaining the right data to generate meaningful results.

One of the most immediate requirements for these technologies is the targeted attraction of FDI. Attracting FDI is a highly competitive business. There are countless public and private sector investment attraction organisations across the world, working hard to identify and secure company expansions within their jurisdictions. Being a first-mover is paramount to success. One of the biggest challenges is identifying a company amongst thousands of candidates. Resources are limited and must target companies with the best chances of success.

For example, the investment attraction firm Economic Development Winnepeg (EDW) located in Manitoba, Canada, recently announced it would use the machine-learning platform Gazelle.ai to analyse vast quantities of data to shortlist, and select, candidate investment companies [235]. This allows EDW to focus business development efforts on companies where the economic benefits will be greatest.

Another approach being used in combination with AI is multiple-criteria analysis (MCA). This is a decision analytic technique for ranking and scoring the desirability of a finite set of decision options against multiple criteria. The criteria are typically weighted to reflect their relative importance to the decision maker. MCA is used extensively by both companies deciding where to invest and jurisdictions deciding which companies to attract [236]. When evaluating companies, the criteria might relate to growth potential, recruitment potential, R&D spending, and the extent to which the jurisdiction is a good match and likely to attract the company.

Machine learning and AI can be used to help an Australian company determine which export markets are best aligned to their products and services. Attempting to export into the wrong market can be a costly error. However, exporting into a high demand and rapid-growth market with few competitors can be extremely lucrative.

Data science can help determine the current and future export opportunities for Australian companies. It can achieve a much more tailored and granular analysis of the opportunities using data about the company and its products. Data-science approaches can also ensure that the most up-to-date and comprehensive information is utilised.

Action 2

Boosting digital exports

As documented in the megatrends, Australia's digital exports are growing rapidly. However, there is scope for additional growth. The megatrends have described the explosion of demand for digital products and services associated with the COVID-19 situation. There is an opportunity to capitalise on shifts in the global supply and demand for digital products and services. There are three main areas for action:

1. Securing a free and fair trade landscape for digital products and services. A recent analysis by the Export Council of Australia [35] identifies a set of priority actions to improve Australia's digital trade. These fall both within Australia's direct jurisdictional control and indirect control via influencing global/regional trade agreements. The actions relate to domestic copyright laws, global/regional trade distortions (such as customs duties), global data governance, global data standards and interoperability, and international border trade-frictions (such as administrative procedures).

2. Enhancing Australia's digital technology capabilities. Such economic transformation will change work, and create new jobs and new skills. Our digital capability covers human skills, digital infrastructure and scientific and technological research capability. Improved digital capability is likely to attract investment and boost exports. Governments will need to drive an environment where new industries and markets can thrive. This will require investment in exports, skills, education, and technology.

3. Building Australia's brand profile for trusted, reliable, and high-quality digital solutions. Trust, transparency, reliability, and quality of digital products and services will be an increasingly important differentiator in global markets. Targeted campaigns that elevate the visibility and profile of Australia's digital technology sector will help us grow exports and investment.

In addition to these actions, there is also an opportunity to help Australian companies develop strategies for exporting digital products. This would involve the provision of advice about the best markets and sales strategies. It could also include providing connectivity between overseas buyers and Australian sellers of digital services. Another angle would involve the marketing and brand-profiling of Australian digital products and services in target markets.

There's a substantial body of work underway by the Australian Government under the 'Services Export Action Plan'. This captures digitally enabled services exports and involves industry consultation and a detailed government response to the action plan was published before COVID-19 [15, 16]. The post-COVID-19 environment further heightens the extent of the opportunity to boost digitally enabled service exports and the importance of the action plan.

In summary, this strategic action involves a coordinated industry-wide effort to remove barriers and build the right business environment to further boost Australia's digital exports.

Action 3

Developing a refreshed and expanded R&D investment attraction program

Since the 2008–09 global financial crisis, there has been a large increase in R&D spending across the globe. According to the United Nations most recent data for 2017, global R&D spending by all public and private sector organisations, reached a record high of US$2.19 trillion. This is up from US$1.75 trillion in 2013 [9]. According to PwC the top 1000 most innovative companies in the world spent a record US$782 billion on R&D in 2018, which is up 11.4% on the previous year [237]. The top five spending companies in 2018 were Amazon, Alphabet, Volkswagen, Samsung, and Intel. These companies spend between 6% to 21% of their revenue on R&D. Research by McKinsey & Company [58] and the United Nations [238] shows that companies and countries that invested in R&D were able to survive, and grow beyond, the global financial crisis better than others. There is a likelihood that the trajectory of global growth in R&D spending will continue during and after the COVID-19 crisis. Much of this R&D will take the form of FDI.

Australia is well-placed to respond to expanding FDI for R&D. As documented in the 2019 and 2020 Australia Benchmark Reports [99, 239] – which capture Australia's relative placement on a wide range of social, economic, and environmental rankings – we are global leaders in many fields of science, research, and technology. For example, publications from Australian researchers have relative impacts (measured from citations) at least 20% above the world average in 20 out of 22 scientific fields. Australia has seven universities in the global top 100 Academic Ranking of World Universities [99]. In other rankings, Australia comes in first for technological readiness and fifth for global entrepreneurship. Almost 50% of Australian firms rate as innovation active, and around 44% of Australia's workforce has a tertiary qualification [99]. Australia's national science agency, CSIRO, is in the top 1% of the world's scientific institutions in 14 of 22 research fields. When considered alongside our strong economy, stability, security, natural environment, excellent quality-of-life, and problem-solving culture, there is a compelling case for growing R&D capability in Australia.

From an Australian perspective, R&D FDI, as opposed to other types of FDI, is particularly desirable because it has spillover benefits [240]. R&D FDI improves the scientific, technological, and research capabilities of a country, which is associated with productivity uplift, which, in turn, leads to increased economic growth and job creation. The COVID-19 crisis may create a window of opportunity for Australia to meet the R&D needs of companies and governments worldwide.

In summary, this strategic action would involve a coordinated campaign of R&D FDI attraction by universities, research organisations, industry, and state/territory and federal agencies led by Austrade.

Action 4

Delivering on the perception and reality of the world's safest holidays

Travel will only resume when it's safe to do so. However, despite the COVID-19 downturn, global tourism markets are large and growing. This growth will continue in some form beyond the crisis; people will still want holidays. For the most recent World Bank data in 2018, global tourism expenditure reached a record high of US$1.575 trillion after a prolonged period of strong growth [241]. As tourism resumes, safety will guide destination decisions. Australia can lead the world by offering the highest standards of safety for visitors and the highest standards of safety for residents.

Being a safe destination has recently become an even bigger drawcard. There's a large body of research published by tourism experts over the past 20 years showing that safety perceptions are a paramount consideration for people choosing a holiday destination. A recent review published by researchers at the University of Queensland Business School summarises 142 published papers on the topic [242]. Another review on the topic by researchers at Curtin University finds that 'tourist perceptions of risk and safety is one of the key factors in their decision-making process to travel to a destination' [243]. The COVID-19 crisis is likely to elevate the importance of safety.

Australia is one of the world's safer, if not safest, place to have holiday. A report by Deep Knowledge Group [244], reported in Forbes [245], evaluated the world's countries in terms of COVID-19 safety for tourists against 130 quantitative and qualitative indicators such as infection spread risk, health system readiness, monitoring, and detection. Australia comes in at rank position 8 (out of 200) in terms of overall COVID-19 safety for an international tourist. However, Australia's safety goes beyond COVID-19. US travel insurance company Berkshire Hathaway Travel Protection found Australia to be the safest country worldwide in 2020, up from the second place in 2019 [246]. This is based on a comprehensive travel safety assessment, including a survey of thousands of US travellers combined with the State Department Safety Rating, the Global Peace Index, the UL Global Safety Index, and the Global Finance Index of Destination Safety. Some additional measures that could further improve the safety of Australia for tourists would include (but are not limited to) travel bubbles, travel corridors, visa/border controls, and industry-wide hygiene standards.


Lizard Island

Another opportunity for disease-safe tourism relates to the domestic market. As some states and territories relax COVID-19 restrictions, domestic and local tourism is on the rise. This is a lucrative market that can boost jobs and growth in Australia's regions. In 2018–19 Australia imported $58.3 billion worth of travel services purchased by businesses and households. By comparison Australia exported travel services worth $39.1 billion in the same year. This means we have a travel deficit of $19.2 billion [5]. Luring the Australian overseas holidaymaker to Australian destinations represents a significant economic opportunity [99].

In summary, this strategic action covers a wide range of activities designed to improve yet further Australia's reputation for tourism safety for domestic and international travellers. There is an opportunity for Australia to capitalise on its excellent disease mitigation and overall safety standards to capture a safety-related shift in global tourist markets. Clearly visitors can only enter Australia, and travel domestically, when health authorities deem the risks to be acceptable.

Action 5

Building a pandemic-proof international education sector

According to the Australian Government Department of Foreign Affairs and Trade, education-related travel services, including tuition fees and living expenses, amounted to $37.6 billion for the most recent year of data being fiscal year 2018–19. This represents 8% of all export earnings and is in the fourth-largest position after iron ore, coal and natural gas. Education exports have risen sharply over the past decade, with 15.2% growth over the past five years [7].

However, COVID-19 restrictions prevented many overseas students from entering Australia with short, medium, and long-term impacts on the university sector and the national economy. Two independent models of the economic impact by Universities Australia [126] and The University of Melbourne [8] estimate the sector will lose student-fee revenue of $16 billion by 2023 and $18 billion by 2024. In addition to these losses of travel, accommodation, and living expenditure, analysis by The University of Melbourne found that of 38 exposed Australian universities, a number were at high risk of revenue losses exceeding available cash and investment reserves.

But what are the solutions? A range of short-term adjustments are being used or being considered, for reducing university costs [8]. These include delays or scope reductions to capital works, selling property, having fewer campuses, rationalising course and subject offerings, reviewing corporate (head office) managerial salaries, reducing administrative costs, and reducing overall staff costs. However, these are nearer-term adjustments. If the contraction of the international student market, in its current form, is prolonged or ongoing new business models will be needed. Arguably the most promising avenue for Australian universities to continue offering their well-regarded programs to international students will be via digital models, which allow for remote learning and assessment. These are already widely used, but there is scope to substantially grow, diversify, and improve the quality and quantity of online learning. There may also be an opportunity to provide offshore campuses, which negate the need for overseas students to cross international borders.

There may be options to reposition course offerings and learning styles to the broader needs of the domestic market. Expenditure on all forms of education in Australia expects to grow from $36 billion in 2019–20 to $41 billion in 2022–23 [247]. One area of growing demand is digital reskilling. Numerous studies have pointed towards the urgent need for substantially upgrading skills in AI, data science, machine learning, robotics, cybersecurity, and many other types of digital technology. These are all showing signs of increased demand in the digitally immersed, and digitally dependent, post-COVID-19 world.

In summary, this strategic action is about identifying the full range of short, medium and long-term actions for Australia's universities and its tertiary education and training sector to identify and harness new opportunities in the mid/post-COVID-19 world.

Action 6

Boosting Australia's critical minerals exports

There are 17 critical minerals elements in the periodic table. Some of the more well-known elements are lithium, cobalt, titanium, and uranium. These critical minerals elements are critical inputs for countless manufactured products. They are particularly important for high-growth technology products such as batteries, computer screens, and fibre optics. Due to the essential nature of critical minerals, supply chain resilience is of paramount importance.

Since the trade wars, companies have been searching for more diversified, ethical, and resilient critical minerals supply chains, and this search substantially accelerated in 2020 [17]. For example, as reported in the Australian Financial Review on 3 June 2020 [248] the Australian company Hastings Metals recently secured a contract to supply critical minerals to a German manufacturing company called Schaeffler. Schaeffler makes high-precision components for aerospace, automotive, and other industrial uses. They turned to Australia for a more reliable supply.

Similar success stories are enjoyed by other Australian critical minerals mining companies such as Lynas Corporation. Australian iron ore mining companies such as Fortescue, Rio Tinto and BHP Billiton have also maintained reliable iron supply during COVID-19 situations. By comparison, the Brazilian mining company Vale has struggled to maintain reliable supply [248]. For example, a local court ordered Vale to close significant operations after 188 workers tested positive for COVID-19 at the Itabira mining complex in Brazil [249].

The economically feasible development of critical minerals, and expansion of mining generally, will increasingly depend on scientific and technological innovations, fuelled by sectoral investment in R&D. Australia's $92 billion per year mining equipment, technology, and services (METS) sector, which is growing at 7% per annum, will be an important enabler of our mining industry [56, 57]. METS is also a significant and growing export earning industry itself.

In 2019 the Australian Government launched a report titled 'Australia's Critical Minerals Strategy' [18]. This report notes that Australia has the world's third-largest reserves of lithium and is ranked sixth in the world for critical minerals elements with large resources of cobalt, manganese, tantalum, tungsten, and zirconium. The report identifies national actions relating to investment promotion, innovation incentives, and infrastructure development. As demand for high-quality and reliable critical minerals supplies expands in the mid/post -COVID-19 world, the actions identified in this report have heightened importance.

Image courtesy of Austrade

Action 7

Expanding food, agricultural and agri-tech exports

The COVID-19 crisis has seen the production, trade, and consumption of some food products decline while for others it has expanded. Whilst global food trade is forecast to resume; COVID-19-related supply chain disruptions have created risk and uncertainty. As with many post-COVID-19 markets, buyers will be increasingly seeking secure, safe, and reliable food supply chains.

There is an opportunity for Australia to expand secure, safe, healthy, and reliable food supply chains and distributions systems in the post-COVID-19 world economy. There is also an opportunity to attract increased investment and exports within our well-developed agri-tech industries, which enable higher standards of food production [99]. The nature of actions taken to achieve these outcomes have been well-explored in other reports. For example, a report titled 'The Impact of Freight Costs on Australian Farms' [250] by Deloitte for AgriFutures identifies the challenges associated with transportation and logistics for the agricultural sector with recommendations for improvements. Another report by venture capital platform AgFunder [251] explores the opportunity for Australia in the global US$16.8 billion/year agri-foodtech investment, up from US$2.6 billion in 2012.

Digital technology will play an essential role in identifying where and how to change food distribution systems to open up new opportunities for Australian farmers. For example, the CSIRO TraNSIT model provides detailed maps of routes and costs across Australia's entire agricultural and forestry supply chain [252]. This data-science capability has been used to assess the benefits of infrastructure upgrades and the removal of cross-border bottlenecks to Vietnam and Indonesia. Other food manufacturing, packaging, logistics, and tracing technologies will also help Australian agricultural produce reach distant buyers cost-effectively as well as increase domestic supply.

Lastly, the rise of zoonotic illnesses such as COVID-19, which are transferred from animals to humans, may place some worldwide livestock production systems under scrutiny. There is also the ever-present and growing risk of antimicrobial drug resistance, which is being exacerbated by the incorrect and excessive application of antibiotics in some global agricultural sectors. Australia's high standards of hygiene, food safety, animal welfare, and environmental performance will increasingly differentiate our products in world markets. Furthermore, the know-how associated with these high-performance systems can also be exported.

As with the highly successful METS sector, Australia's agri-tech industry has considerable room for investment attraction and export expansion. There's also an opportunity to respond to a surge in demand for disease-safe livestock production systems.

Action 8

Developing an export-earning disaster-resilience technology industry

Global demand for trusted technologies for the management of wildfires, droughts, heatwaves, floods, pandemics, and cybercrime is set to escalate. As we develop solutions to these challenges in Australia there's an opportunity to identify, and supply into, global export markets.

In summary, this strategic action involves building Australia's brand, reputation, and capability for the supply of trusted solutions to disasters worldwide. It also involves developing market intelligence to identify buyers and their specific requirements.

Action 9

Developing trade and investment foresight capability

With the forecast massive contraction in worldwide FDI and slow-down in global economic output, the trade and investment landscape is likely to become more competitive. An ability to read megatrends and weak signals will help Australia gain first-mover advantage. Trade strategy can be informed by scenario planning and wildcard (risk) analyses to ensure we're well-prepped for all future risks and opportunities.

These techniques fall under the field of strategic foresight, the systematic exploration of plausible future events to inform current-day decision making. Foresight capability would complement the more quantitative approaches identified in the first strategic action about data science and data-driven trade and investment.

5 Conclusion

Usually, our megatrends reports analyse change over a 5–20 year time frame; this one has a much shorter time frame of months and years. In the current era, much change is being packed into a short period. This report has described mid/post-COVID-19 shifts in the global trade and investment landscape through the lens of megatrends. Together the megatrends describe a markedly different business and economic context to what existed six months ago. Stemming from the megatrends are a set of strategic actions designed to mitigate risk and harness opportunity.

The headline statistics are that global trade and investment are contracting sharply. There's been an estimated 14.3% contraction in global merchandise trade volume within the second quarter of the calendar year 2020 [3]. Foreign direct investment (FDI) is forecast to shrink by 40% [1, 13]. This is against a backdrop of –4.4% economic growth for the current year. However, there are signs of recovery and expectations of a rebound within a few years. Due to the size of the shock, the new trade and investment landscape that emerges will be different from what it was before. There are expectations of long-term structural shifts.

Digital technology will play a critical role in the rebuild. Telework, telehealth, online retail, online education, and online entertainment are all booming. A vast swathe of economic activity has transferred from the physical world to the virtual world. Much will not go back. There is an opportunity to grow digital exports. There is also an opportunity to use digital technologies to grow all export categories. The world has seen ten years' worth of digital transformation in the space of a few months.

While there is much change in the landscape for trade and investment, both remain important to our economy. Trade and investment are effective ways of boosting economic growth and escaping a slump. While the global trade and investment marketplace will become more competitive, Australia has significant sources of comparative advantage. There's likely to be a flight from risky to safe assets and supply chains. The safe-haven effect is likely to favour Australia. We have maintained reliable supply chains and a stable economy throughout the crisis.

As the competitive landscape reshapes over the coming months and years, early and strategic actions to achieve first-mover advantage will be necessary. The pool of FDI funds is shrinking relative to demand. Export markets are also contracting in line with a shrinking global economy. Other countries will be competing hard to attract investment in their post-COVID-19 recovery plans. Strategic foresight can help us read the signals and move before the marketplace.

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Appendix: Our strategic foresight framework

Over the past ten years, via advisory activities, workshops and research projects across practically all industries and sectors, CSIRO scientists have pioneered a strategic foresight framework (Figure 29). The work began with the publication of the megatrends report 'Our Future World' in 2010 [253] with an update in 2012 [254] and the publication of a book 'Global Megatrends' [219] through CSIRO Publishing in 2015. These products became some of CSIRO's most heavily downloaded, widely used and best-selling reports/books due to strong and sustained demand by industry, government and community organisations. The methods were applied in some of Australia's most influential foresight studies relating to the future of sport [255], the future of work [256], the future of agriculture [257], the future of tourism [258], the future of property markets [259] and a long and growing list of similar reports. The aim of this body of work, and our foresight methods, is to help organisations explore plausible futures, become first-movers and make wise choices.

Our approach to strategic foresight has five main stages. We commence with a descriptive background study and scope definition to understand the industry, sector, company or issue we're studying. This informs a subsequent horizon scanning process where we search for all relevant geopolitical, economic, environmental, social and technological trends. Trends are patterns of change with tighter spatial, temporal and typological expression compared to megatrends. A wide net is cast over all potentially relevant trends which are screened, classified and prioritised at a later stage. Each trend is tested against evidence (proof that it's happening) and relevance (proof that it matters). Once the trends clear these tests they're included in the analytic set.

The next stage of the process involves clustering trends to identify scenarios [260], megatrends [219, 261], weak signals [262] or wildcards [263]. Scenarios are descriptions of plausible future conditions at a given point in time. Megatrends are deep-set trajectories of change occurring at the intersection of numerous interconnected trends. Scenarios and megatrends are connected concepts. The megatrends can play out in different ways and these alternative futures are captured via scenarios. Weak signals can be identified from the trends database and relate to early, formative and unclear patterns of change which have the potential for significant consequences. Wildcards are low probability, hard-to-predict and seemingly unlikely events sometimes referred to as the bolts from the blue or black (or grey) swans.

The most frequently applied tools in our work are megatrends and scenarios. To identify a megatrend we search for related trends which, when combined, create a deep-set trajectory of change. This can involve systems models and network analysis to discover which trends are connected to others. Megatrends typically have decadal time frames. However, pending the scope of the foresight study, they could potentially be measured over months, years or centuries. It depends on the nature of the phenomenon being studied. To identify scenarios we often apply deductive reasoning as per the Oxford Scenario Planning Approach [260]. In our interpretation of this approach we identify 1, 2 or 8 axes of critical uncertainty which can be combined to create 2, 4 or 8 scenarios. However, inductive approaches are also effective when the problem doesn't fit the conventional quadrant-style structure.

The next stage involves the development of a narrative. This critical component is where all the data and its implications are converted into a story which is accessible, relevant and insightful for decision makers. Stories are how people learn. Humans across all cultures are told stories from childhood through to adulthood. A strategic foresight narrative is centred on science, facts and evidence. It takes an objective, an impartial perspective designed to inform a wide range of decision makers and stakeholders. This last stage is more about the 'art' of the art and science of strategic foresight. Some foresight studies fail at this last stage. They fail to convert data-driven insights about the future into a meaningful narrative. Narrative is central to organisational strategy and government policy [264]. It warrants equal investment alongside the quantitative and analytical tasks of the foresight study.

The final step involves connecting the foresight results to decision making. A foresight study is only useful if it helps someone make a better decision. This can happen via many direct and indirect ways. Direct application of foresight could involve explicitly linking the scenarios or megatrends to strategic actions designed to mitigate risk and harness opportunity. It could also involve the stress-testing of strategy under all plausible futures to discover weaknesses and opportunities for improvement. Sometimes a decision-making technique called 'multiple criteria analysis' is used to rank or score decision options given all plausible future scenarios and megatrends. Indirect approaches are also powerful. Sometimes it may be best to remain muted on action-items within the foresight study or report. This allows others to join the dots and identify actions that achieve their desired objectives. Self-generated actions are more likely to get done. The best ways of linking foresight to action remains a significant topic for researchers working in the field of strategic foresight [265].

We note that over recent decades there has been an explosion of strategic foresight applications and methodology. It is a growing profession and research field. Our frameworks have been developed by reviewing the work of others and through hundreds of small and large foresight activities over the last ten years. Every time we do a foresight study, we learn more about how to make it effective.

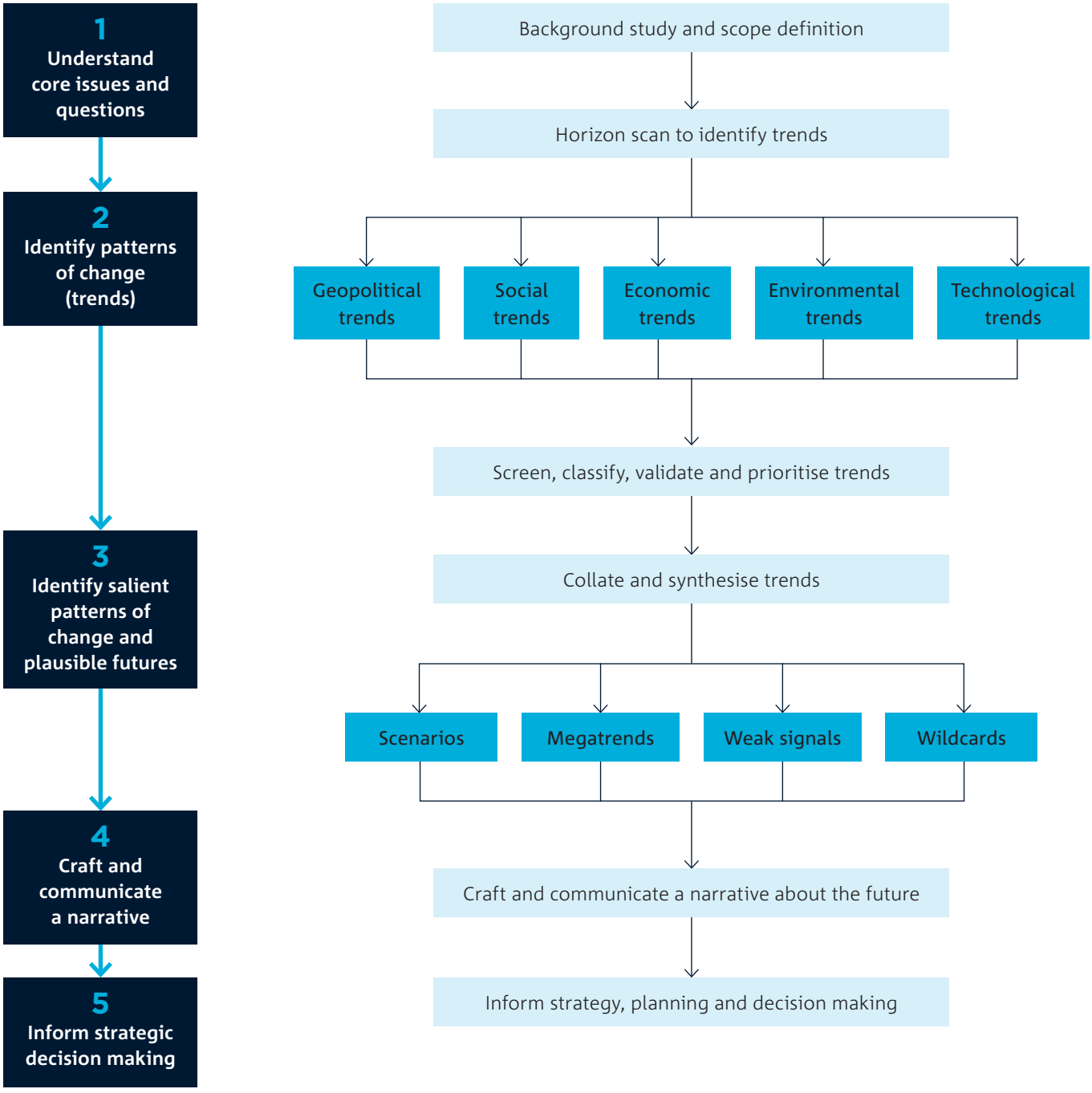

Figure 29. Strategic foresight approach developed by CSIRO Data61 Insights team.

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