OECD Reviews on Local Job Creation

Preparing for the Future of Work Across Australia

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Foreword

This OECD report comes at a time when governments around the world are beginning the process of recovery from the COVID-19 crisis. With the closure of its borders to non-residents in March 2020, and by quickly imposing social distancing rules and closures of non-essential services, Australia, with among the lowest death rates in the world, has weathered the pandemic relatively well compared to many other countries but some of its regions have been hit harder than others. Small outbreaks have led to short localised lockdowns and some state border closures. Vaccinations began in February 2021, with widespread vaccination expected by the end of 2021.

COVID-19 is likely to accelerate the megatrends that were already changing labour markets prior to the pandemic. But although Australia has been spared the worst of the pandemic's effects, like many other countries, it has led to an acceleration in automation as firms expanded their use of technologies in the face of lockdown measures. The pandemic has also accelerated other megatrends, in particular around sustainability, and heightened awareness of inclusiveness, as part of an agenda to 'build back better.' Whilst, the long-term impacts of these changes remains uncertain, for example with respect to remote-working, it is more likely than not that they result in permanent changes, at least in some form. It is also inevitable that the transitions will differ across people and places. Some will find the transition more difficult, however it could also reorient trends such as urbanisation and globalisation that open up new opportunities for places that were previously left behind.

This OECD report sheds light on the threats and opportunities facing local labour markets in Australia in the future of work. It also highlights the actions needed to prepare people, places and firms. The report includes a special focus on the regions of Sydney-South West (New South Wales) and Warrnambool and South West (Victoria). Even before COVID-19, automation, digitalisation and artificial intelligence were already re-shaping local labour markets across Australia. Whilst these trends offer the opportunity to boost productivity, increase prosperity and raise living standards, they can also cause disparities. Workers who lose jobs may not always have the skills needed in a changing labour market and might struggle to find a new job and the opportunities are not always equal across places.

This report is part of the OECD Review on Local Job Creation Series within the Programme of Work of the OECD Local Employment and Economic Development (LEED) Programme. Created in 1982, the LEED Programme aims to contribute to the creation of more and better jobs in more productive and inclusive economies. It produces guidance to make the implementation of national policies more effective at the local level, while stimulating innovative practices on the ground. The OECD LEED Directing Committee, which gathers governments of OECD member and non-member countries, oversees the work of the LEED Programme. This report was approved by written procedure by the OECD LEED Directing Committee on 22 June 2021.

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This report was drafted by Alessandro Kandiah, Policy Analyst, Local Employment, Skills and Social Innovation (LESI) Division (OECD/CFE), under the supervision of Jonathan Barr, Head of the Employment and Skills Unit within CFE/LESI. Karen Maguire, Head of the LESI Division, provided overall guidance. Tahsin Mehdi, from the CFE/LESI Division, as well as Michela Meghnagi and Ida Peltonen, formerly in the CFE/LESI Division, contributed to this report through analysis and data collection.

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Table of contents

Foreword 3

Acknowledgements 4

Acronyms and abbreviations 9

Executive summary 11

1 Assessment and recommendations 15

Australia has remained resilient despite the COVID-19 crisis but labour market inequalities have surfaced 15
Prior to the pandemic, local labour markets had experienced diverging trends in Australia 15
Automation is likely to accelerate in a post-COVID-19 labour market 16
Labour and skills shortages are an issue in Australia, and they risk being exacerbated by COVID-19 18
The Australian Government has developed a comprehensive framework to prepare people, places and firms for the future of work 18
What are the policy opportunities for Australia going forward? 19

2. The local impacts of automation in Australia 25

Introduction 26
2.1. COVID-19 is posing unprecedented challenges to local labour markets, but Australia remains resilient 27
2.2. The risk of automation in Australia 39
2.3. What are the local impacts of automation in Australia? 47
2.4. Special focus on Sydney-South West (New South Wales) and Warrnambool and South West (Victoria) 56
References 61
Annex 2.A. Jobs at risk of automation 65

3 Job polarisation and changing skills needs at the local level in Australia 77

Introduction 78
3.1. Labour demand in Australia bounced back quickly after being hit by COVID-19 79
3.2. Skills mismatches were a challenge in Australia before COVID-19 hit 83
3.3. Job polarisation is shifting labour market dynamics across Australia 87
3.4. Job polarisation has gone hand in hand with skills upgrading 95
3.5. The future of work requires action on both the skills supply and demand in Australia 97
References 105

4. Future-proofing people, places and firms in Australia 109
Introduction 110
4.1. COVID-19, the megatrends and jobs 111
4.2. Preparing Australians for a changing labour market 116
4.3. Helping places transition into the future of work 126
4.4. Supporting firms in a changing world of work 138
References 145

Tables

Table 1.1. Which Australian regions have the largest share of jobs at risk of automation? 17
Table 1.2. Which Australian regions have the lowest share of jobs at risk of automation? 17
Table 2.1. Bottlenecks to automation 42
Table 2.2. Automation bottleneck correspondence 43
Table 2.3. Which Australian regions have the largest share of jobs at risk of automation? 48
Table 2.4. Which Australian regions have the lowest share of jobs at risk of automation? 48
Table 2.5. The typology 55
Table 2.6. Sydney-South West has high employment shares in occupations at high risk 57
Table 2.7. Warrnambool and South West tends to have higher employer shares in occupations at risk than Victoria 60

Annexe Table 2.A.1. Share of jobs facing significant risk of change, high risk of automation, and average risk of automation 65
Annexe Table 2.A.2. Number and share of jobs facing risk of significant change or high risk of automation in the Australian Capital Territory 67
Annexe Table 2.A.3. Number and share of jobs facing risk of significant change or high risk of automation across New South Wales 68
Annexe Table 2.A.4. Number and share of jobs facing risk of significant change or high risk of automation across the Northern Territory 70
Annexe Table 2.A.5. Number and share of jobs facing risk of significant change or high risk of automation across Queensland 71
Annexe Table 2.A.6. Number and share of jobs facing risk of significant change or high risk of automation 72
Annexe Table 2.A.7. Number and share of jobs facing risk of significant change or high risk of automation 73
Annexe Table 2.A.8. Number and share of jobs facing significant risk of change or high risk of automation 74
Annexe Table 2.A.9. Number and share of jobs facing risk of significant change or high risk of automation across Western Australia 75

Figures

Figure 2.1. The total jobactive caseload almost doubled in light of COVID-19 and is now steadily declining 29
Figure 2.2. Total employment in Australia started growing in June 2020 and recovered to pre-pandemic levels by February 2021 29
Figure 2.3. Unemployment rates recovered to pre-pandemic levels across most Australian states and territories 30
Figure 2.4. COVID-19 has highlighted spatial differences in the ability to perform remote working 32
Figure 2.5. Before COVID-19, the unemployment rate increased in all Australian states and territories except for New South Wales between 2008 and 2019 33
Figure 2.6. Many Australian regions had not recovered in 2019 to pre-2008 unemployment rate levels 34
Figure 2.7. Number of jobs increased in most states and territories over the five-year period leading up to the COVID-19 pandemic 35
Figure 2.8. Capital city regions have driven job creation in each state and territory 35
Figure 2.9. Manufacturing employment has steadily declined in Australia 37
Figure 2.10. In some regions, Manufacturing still accounts for more than 10% of total employment 38
Figure 2.11. Labour productivity is highest in states and territories relying on utilities and resource extraction 39
Figure 2.12. More than a quarter of Australian businesses reported an increase in take-up of new technology and automation due to COVID-19 in 2020 41

Figure 2.13. Risk of automation in Australia is lower than the OECD average 41
Figure 2.14. Which occupations in Australia might be most impacted by automation? 44
Figure 2.15. Jobs at risk of automation entail a low frequency of tasks safe from automation 45
Figure 2.16. Australian men face a higher risk of automation than women 46
Figure 2.17. Indigenous Australians tend to work in lower-skill occupations, which have a higher probability of being automated 46
Figure 2.18. The share of jobs at risk of automation is lowest in the Australian Capital Territory 48
Figure 2.19. The share of jobs at risk of automation varies substantially within most states and territories 49
Figure 2.20. The risk of automation tends to be higher in Australian regions with higher employment shares in Manufacturing 50
Figure 2.21. Regions with a higher share of jobs at risk of automation tend to have higher unemployment rates 53
Figure 2.22. The share of jobs at risk of automation is higher in regions with lower levels of skills 54
Figure 2.23. Most Australian regions have created jobs predominantly in less risky occupations since 2006 55
Figure 2.24. Sydney-South West faces the second highest risk of automation in New South Wales 57
Figure 2.25. Sydney-South West has created jobs mainly in occupations at lower risk of automation 58
Figure 2.26. In Warrnambool and South West, the risk of automation is among the highest in Victoria 59
Figure 2.27. Warrnambool and South West has created jobs mainly in occupations at lower risk of automation 60
Figure 3.1. Online job postings in light of COVID-19 have varied across Australia 79
Figure 3.2. Job vacancies have recovered in Australia, following a significant drop at the beginning of the COVID-19 pandemic 81
Figure 3.3. The extent of job vacancy recovery have varied across states and territories 81
Figure 3.4. Employers' staffing expectations increased after the initial COVID-19 shock 83
Figure 3.5. The lack of applicants is the main driver of skills shortage in Australia 84
Figure 3.6. Field of study and qualification mismatch in Australia and the OECD 85
Figure 3.7. Underqualification tends to be more prevalent than overqualification across Australia 86
Figure 3.8. The majority of Australian regions are in a high-skill equilibrium, but differences exist 87
Figure 3.9. Job polarisation in Australia 89
Figure 3.10. Employment has primarily shifted towards high-skill jobs in all Australian states and territories 90
Figure 3.11. All regions have created high-skill jobs, but the majority have also created middle-skill ones 91
Figure 3.12. The relationship between skills and income has loosened across the OECD 94
Figure 3.13. Share of adults, 25 to 64 years old, with a tertiary education in Australia is higher than the OECD average 95
Figure 3.14. The share of Australians with a bachelor's degree, advanced diploma or certificate has increased over the past decade 96
Figure 3.15. The share of population with bachelor's degree and above varies widely within states and territories 97
Figure 3.16. Australian adults perform better than across the OECD in problem-solving in a technology-rich environment 98
Figure 3.17. Australia is behind the United States, Canada and England in adult training participation 101
Figure 3.18. Most Australians who did not participate in training were too busy at work 101
Figure 3.19. There are a number of gaps in training participation across Australia 102
Figure 3.20. Australia performs around the OECD average in the use of High Performance Work Practices (HPWPs) 104

Annex Figure 2.A.1. Share of jobs facing risk significant change or high risk of automation in the Australian Capital Territory 66
Annexe Figure 2.A.2. Share of jobs facing risk of significant change or high risk of automation across New South Wales 67
Annexe Figure 2.A.3. Share of jobs facing risk of significant change or high risk of automation across the Northern Territory 69
Annexe Figure 2.A.4. Share of jobs facing risk of significant change or high risk of automation across Queensland 70
Annexe Figure 2.A.5. Share of jobs facing risk of significant change or high risk of automation across South Australia 72
Annexe Figure 2.A.6. Share of jobs facing risk of significant change or high risk of automation across Tasmania 73
Annexe Figure 2.A.7. Share of jobs facing risk of significant change or high risk of automation across Victoria 74
Annexe Figure 2.A.8. Share of jobs facing risk of significant change or high risk of automation across Western Australia 75

Boxes

Box 2.1. Government support for businesses, employees and job seekers during COVID-19 30
Box 2.2. Estimating the risk of automation across OECD countries 42
Box 2.3. How is the regional risk of automation calculated? 49
Box 2.4. How will the future of work impact the tourism sector? 52
Box 2.5. A regional typology for employment creation in the face of digitalisation and automation 55
Box 3.1. Using Burning Glass Technology for regional labour market analysis 80
Box 3.2. Changing labour market skill requirements amidst transition to net-zero emissions 82
Box 3.3. Defining low-, middle-, and high-skill jobs 88
Box 3.4. Case study areas: Sydney-South West and Warrnambool and South West 92
Box 3.5. The importance of "hybrid skills": evidence from Canada 99
Box 3.6. Australia's Skills Match online tool 103
Box 4.1. COVID-19 Recovery Plan in New South Wales 113
Box 4.2. Establishing local boards or facilitators: the experience of other OECD places 117
Box 4.3. Supporting workers re-skill and up-skill in light of COVID-19: examples from the United Kingdom 118
Box 4.4. The trade-offs of digital employment service delivery 120
Box 1.5. Individual learning schemes: examples from France and Canada 122
Box 4.6. Example of projects under the National Partnership in the Australian Capital Territory 124
Box 4.7. International lessons in reforming post-secondary education in Ontario, Canada 126
Box 4.8. Boosting future skills for the mining sector in Australia 126
Box 4.9. The STEMship programme by RDA Hunter (New South Wales) 127
Box 4.10. Regional Employment Trials in Far South Coast, New South Wales 129
Box 4.11. The EU Youth Employment Initiative: targeting regions with high youth unemployment 130
Box 4.12. Success stories from the Jobs and Regional Growth Fund in Queensland 132
Box 4.13. Local job creation opportunities from the New Western Sydney Airport 133
Box 4.14. Supporting COVID-19 hard-hit industries in Canada 134
Box 4.15. Promoting transitions in the Geelong region (Victoria) 136
Box 4.16. Preparing industries for the future of work in the Basque Country (Spain) 137
Box 4.17. Australian Government's measures in support of SMEs during COVID-19 139
Box 4.18. Incentives for SME training: examples from Canada and Lithuania 141
Box 4.19. Employer-led networks for skills development: examples from Ireland and Korea 142
Box 4.20. Small Business Digital Champions 144

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Acronyms and abbreviations

AI	Artificial Intelligence
AAIP	Australian Apprenticeships Incentives Program
AISC	Australian Industry and Skills Committee
ASQA	Australian Skills Quality Authority
AV	Autonomous vehicle
BII+E	Brookfield Institute for Innovation + Entrepreneurship
COAG	Council of Australian Governments
DESE	Department of Education, Skills and Employment
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GVA	Gross Value Added
GVC	Global Value Chain
G7	Group of Seven
HPWP	High Performance Work Practice
IAA	Incentives for Australian Apprenticeships
ISLP	Infrastructure Skills Legacy Program
JRGF	Jobs and Regional Growth Fund
NASWD	National Agreement for Skills and Workforce Development
NCI	National Careers Institute
NCVER	National Centre for Vocational Education Research
NEET	Neither employed, nor in education or training
NSC	National Skills Commission
OECD	Organisation for Economic Co-operation and Development
PIAAC	Programme for the International Assessment of Adult Competencies
PISA	Programme for International Student Assessment
RDA	Regional Development Australia
RBTC	Routine-biased technical change theory

SERA	Survey of Employers who have Recently Advertised
SERE	Survey of Employers' Recruitment Experiences
SME	Small and Medium-sized Enterprises
STEM	science, technology, engineering, mathematics
TAFE	Technical and Further Education
UNIDO	United Nations Industrial Development Organisation
VET	Vocational Education and Training

Executive summary

While Australia has weathered the COVID-19 crisis better than most OECD countries, some communities were initially hit hard. Like many other countries Australia's labour market felt strong impacts from the first wave of the pandemic, with employment dropping by almost a million between March-May 2020 and the unemployment rate reaching over 7% in July 2020. However, employment was back at pre-pandemic level by February 2021, and unemployment rates dropped below pre-pandemic levels in all regions except the Australian Capital Territory. Until August 2021 when New South Wales began experiencing a spike in COVID-19 cases, Victoria took the brunt of COVID-19 and accounted for about 75% of COVID-19-related infections in Australia, which led to the state implementing some of the most stringent measures against the pandemic. Between February-September 2020, employment in Victoria dropped by 6.6%, but as of June 2021, the number of jobs surpassed the pre-pandemic mark.

Looking at the past, automation often accelerates during economic downturns as firms look to re-organise their business models. Facing lockdown measures, some firms expanded their use of technology to sustain their operations. An OECD survey found that over 26% of Australian firms reported an increase in the take-up of new technology or automation because of COVID-19, with firms in New South Wales (27.0%), Victoria (35.1%), and Australian Capital Territory (35.7%) reporting take-up rates higher than the Australian average. Acceleration of automation is likely to continue, as firms will want to better protect themselves against future economic shocks such as another pandemic.

Automation was already a consideration for local labour markets in Australia before COVID-19. OECD estimates pre-pandemic show that 36% of jobs in Australia are at risk of being automated, compared to the OECD average of 46%. About 11% of jobs face a high risk (i.e. high probability) of being automated, while another 25% are likely to face significant change. Automation will impact places differently. Across Australian states and territories, the share of jobs at risk of automation varies from 29.3% in the Australian Capital Territory to 36.9% in Tasmania. In addition, there are large differences in the risk of automation at the regional level across Australia, depending on the occupational profile and the characteristics of the local economy.

The risk of automation is likely to affect some communities and segments of the population more than others. Across regions, the risk of automation is highest in Mackay-Isaac-Whitsunday in Queensland (41.2%), followed by South Australia-South East in South Australia (40.3%). On the other hand, Sydney-North Sydney and Hornsby and Sydney-Eastern Suburbs have the lowest risk of automation in Australia, standing at 24.6% and 25.5% respectively. Australian men face a higher risk of automation than women (37.1% and 32.0% respectively), as they are more likely to be employed in occupations involving routine and repetitive tasks. Indigenous Australians often work in jobs requiring lower skill levels, which face the highest risk of being automated over the long-term

Risks from automation have already been shrinking in Australian regions. About 81 regions in Australia (91% of total regions) have seen disproportionately higher jobs growth in predominantly less risky occupations between 2006 and 2016, in turn, reducing vulnerabilities of potential job losses to automation. The occupations that have grown the most in terms of total employment at the national level include health

professionals, teaching professionals, production and specialised services managers, and business and administration professionals. The transition to net-zero carbon emissions will also have important implications on many sectors and skills needed.

Automation is more likely to change tasks within jobs rather than replace entire jobs, requiring workers to develop new skills. In the future of work, digital skills will be more important than ever. Australian adults have above average proficiency in problem-solving in technology-rich environments, with about 40% scoring in the top two levels, compared to the OECD average of around 30%. In addition to basic digital proficiency, it will be crucial for Australians to develop know-how of specific digital applications. A recent survey conducted by the NCVER shows that the top five technologies with the greatest impact on skill requirements across Australian industries are mobile, cloud, automation, big data and the internet of things. Digital skills and digital proficiency will be important, but not in isolation. The future of work requires workers to develop a broad mix of skills, including strong basic, cognitive and socio-emotional skills, to succeed in the workplace and be able to adapt to a changing labour market.

Fortunately, all Australian states and territories are shifting primarily from middle-skill to high-skill jobs. The employment share of high-skill jobs increased by about 3.8 percentage points in Victoria, the largest increase recorded across Australian states and territories. Job polarisation dynamics vary substantially at the local level in Australia. Some regions have experienced increases in the employment share of middle-skill jobs over the past decade. The most prominent example is the Outback North region in Western Australia, where middle-skill jobs increased by nearly 5 percentage points between 2006 and 2016. Increases in mining activity may partly explain the increase in middle-skill jobs in the region.

Recent policy efforts in Australia have focused on providing support to workers and firms in light of the pandemic. The Australian Government has also taken important steps to prepare workers for the upturn and future-proof communities. For example, the recently established National Skills Commission places skills development at the core of the government policy for the future of work. There are also relevant initiatives to support local development and job creation across regional areas, such as the Local Jobs Program.

The following recommendations emerge from this report, focusing on future-proofing people, places and firms in Australia:

- **Ensure workers most in need receive targeted support to re-skill and up-skill**. Targeted measures in support of low-skill workers as well as workers from sectors at risk of automation or hard-hit by COVID-19 could be introduced. For the most disadvantaged groups, the social economy can play a role.
- **Support the emergence of local partnerships for skills development**. Businesses and governments could work together at the local level to develop practical solutions and help workers transition to the jobs of tomorrow. Co-designed and co-funded training programmes as well as online learning platforms could play an important role.
- **Strengthen programmes with sector-focused training**. There is an opportunity to mainstream sectoral approaches to skills development to ensure workers in key sectors for local economies have the right skills.
- **Facilitate transitions towards sectors facing a lower risk of automation, building on the existing skills base of the local population**. The establishment and promotion of sectoral networks could help identify opportunities to build on the existing skill base of the population to shift employment towards occupations facing a lower risk of automation.

- **Consider developing measures to incentivise SME training uptake**. The government could consider providing grants to SMEs, in order to undertake workforce training. The digitalisation of SMEs will require new technical and managerial skills.
- **Promote the emergence of SME networks for skills development**. The creation of partnerships between SMEs can play a crucial role in helping them navigate labour market changes and get easier access to skills development.

1 Assessment and recommendations

Australia has remained resilient despite the COVID-19 crisis but labour market inequalities have surfaced

Australia's labour market rebounded quickly from the COVID-19 shock. According to Australian labour force statistics, during the first wave of the pandemic, employment levels fell by almost a million between March and May 2020, and for the first time in over 20 years, Australia's unemployment rate rose to over 7%. However after peaking at 7.4% in July 2020, unemployment began to fall, and by June 2021 was below its pre-pandemic rate. Employment also started to rebound in June 2020 and reached pre-pandemic levels in February 2021.

Australian states and territories have been affected differently by COVID-19. After the initial outbreak, between March and April 2020, the unemployment rate increased by 1.4 percentage points in Queensland, the largest monthly increase across Australia. On the other hand, in the Northern Territory and Western Australia, the unemployment rate increased by only 0.4 percentage points during the same period. As of June 2020, all states and territories started experiencing gains in employment, after months of job losses, but the unemployment rate continued to fluctuate. In July 2021, the unemployment rate was less than its pre-pandemic level in all states and territories, except for the Australian Capital Territory.

The rise in teleworking during the pandemic has also highlighted labour market inequalities. Teleworking has been a necessary practice during the lockdown period of COVID-19. Workers and businesses have undergone a large scale "forced experiment" where they have continued to operate while being physically separated, provided they had the necessary technological, legal and digital security conditions. OECD finds that the Australian Capital Territory has the highest share of jobs that can potentially be performed remotely (56.2%), followed by Victoria (49.9%) and New South Wales (47.6%). On the other hand, only 36.1% of jobs can be performed remotely in South Australia. Local differences in the share of jobs amenable to teleworking highlight the spatial inequalities in the ability of workers to continue working during COVID-19 across Australian states and territories.

Prior to the pandemic, local labour markets had experienced diverging trends in Australia

Despite positive developments in the labour market prior to COVID-19, the unemployment rate remained higher than the pre-Global Financial Crisis (GFC) level in Australia. OECD data shows that the labour force participation rate, accounting for labour force participants as a share of the working age (15-64 year old) population, has been above the OECD average over the past decade, and amounted to 78.5% in 2019, compared to the OECD average of 72.8%. Total employment in Australia was 20% higher in 2019 than it was in 2008, compared to the OECD average increase of 10%, However, like many other OECD countries, Australia's unemployment rate in 2019 remained higher (5.2%) than before the 2008 GFC (4.2%).

The unemployment rate had increased in all Australian states and territories between 2008 and 2019, except for New South Wales. According to Australian labour force statistics, on average during 2019, the monthly unemployment rate stood at 6.3% in Tasmania and South Australia, while it was 3.4% in the Australian Capital Territory. Regions within states and territories have experienced diverging trends, which reflect place-specific labour market dynamics. For example, looking at New South Wales, the unemployment rate in 2019 was highest in Southern Highlands and Shoalhaven, standing at 8.5%, while it was lowest in Sydney-Sutherland, averaging 2.3% in the same year.

Job creation has been led by capital city regions within each state and territory. In Tasmania, Hobart, which accounts for almost half of total employment there, led the state with 78.0% of net job creation (or 11 000 jobs) between 2015 and 2020. Similarly, in Western Australia, Perth-North West and Perth-South West accounted for 47.7% and 34.6% of net job creation over the same period, corresponding to about 19 400 and 14 100 jobs respectively. In South Australia, Adelaide-South and Adelaide-North created 37.5% and 31.6% of state net job creation (about 19 200 and 16 200 jobs).

Automation is likely to accelerate in a post-COVID-19 labour market

COVID-19 is likely to speed up the adoption of automation, as firms seek to increase their productivity and lower physical interaction within workplaces. An OECD survey found that over 26% of Australian firms reported an increase in the take-up of new technology or automation because of COVID-19, with firms in New South Wales (27.0%), Victoria (35.1%), and Australian Capital Territory (35.7%) reporting take-up rates higher than the Australian average. Historically, automation has gained traction in the wake of economic shocks, when human labour become relatively more expensive as firms' revenues decline. During these periods, employers are more likely to seek labour productivity increases by shedding lower-skilled workers and replacing them with technology and higher-skilled workers. The adoption of automation technologies in Australia's industries has been going on for some time, with Australia being a world leader in mining equipment automation. The need to reduce the frequency and duration of human-to-human contact could further speed up the adoption of automation, as experts warn of the increasing threat of future pandemics.

Australia faces a lower risk of losing jobs to automation than on average across the OECD. Recent OECD estimates show that about 36% of jobs are at high or significant risk of being automated in Australia, compared to the OECD average of about 46%. Food Preparation Assistants, Handicraft and Printing Workers, and Stationary Plant and Machine Operators are the three occupations facing the highest average risk of automation in Australia. Given Australia's occupational structure, personal service workers represent the largest number of at-risk workers, with 314 000 workers who might lose their job or experience significant change due to automation. Men tend to face a higher risk than women, since men are over-represented in occupations related to trades, manufacturing, and mining. Youth and Indigenous workers face a particularly high risk, given that they tend to be employed in occupations entailing more routine and repetitive tasks than the rest of the population.

In Australia, the risk of automation varies at the local level, with some regions more at risk than others. Automatable tasks are more prevalent in certain occupations and sectors, and neither occupations nor sectors are evenly distributed within national borders. Therefore, regions with a higher proportion of jobs relying on routine tasks are likely to experience more disruption, whereas places where more jobs require tacit skills will face lower levels of risk. Tacit skills are based on experience and intuition instead of formal rules, and are therefore more difficult to replicate through mechanical processes or standard algorithms. Moreover, the net-zero carbon transition could lead to job losses in sectors such as mining among others, which likely will not have a significant impact at the national level, but may lead to regional labour market disparities.

The Australian Capital Territory faces the lowest risk of automation across states and territories in Australia. About 29.3% of jobs are at risk of becoming automated in the Australian Capital Territory – 21.3% facing high risk and 8.0% vulnerable to significant change. New South Wales (33.9%), Victoria (34.0%) and Northern Territory (34.5%) also face a lower risk of automatable jobs than the Australia average. However, regional differences in the risk of automation are pronounced within all Australian states and territories. For example, regional variation in the share of jobs at risk of automation amounts to more than 15% in New South Wales, ranging from 40.2% in Hunter Valley exc. Newcastle to 24.6% in Sydney-North Sydney and Hornsby. Looking across all regions, Mackay-Isaac-Whitsunday is the region in Australia facing the highest risk of automation, with about 41.2% of jobs (or 32 000 jobs) at risk. On the other hand, Sydney-North Sydney and Hornsby is the region facing the lowest risk (24.6% of jobs, or 50 000 jobs).

The drivers of job loss due to automation might differ across regions, even when they face similar risks of automation. For example, in rural and remote regions, where agriculture is a prevalent source of income, the risk of losing jobs to automation might be mainly related to the prevalence of low-skilled occupations in agriculture, which could be potentially replaced by machines. On the other hand, the concentration of administrative jobs in regions where a large number of companies are located, might cause the risk of automation in these regions to be related mainly to those occupations.

Table 1.1. Which Australian regions have the largest share of jobs at risk of automation?

State	SA4 region	Share of jobs at risk of automation	Number of jobs at risk of automation
Queensland	Mackay - Isaac - Whitsunday	41.2	32 000
South Australia	South Australia - South East	40.3	31 000
Queensland	Logan - Beaudesert	40.2	54 000
Queensland	Darling Downs - Maranoa	40.2	22 000

Source: OECD calculations based on the 2016 census.

Table 1.2. Which Australian regions have the lowest share of jobs at risk of automation?

State	SA4 region	Share of jobs at risk of automation	Number of jobs at risk of automation
New South Wales	Sydney - North Sydney and Hornsby	24.6	50 000
New South Wales	Sydney - Eastern Suburbs	25.5	34 000
Western Australia	Perth - Inner	26.2	22 000
Victoria	Melbourne - Inner	26.4	83 000

Source: OECD calculations based on the 2016 census.

The good news is that the large majority of regions in Australia (81 regions, accounting for about 91% of regions) are creating jobs facing a lower risk of automation. This suggests that most Australian regions have decreased their vulnerability to automation over the past decade. Employment growth in occupations such as health professionals, teaching professionals, production and specialised services managers, business and administration professionals, have contributed to reducing the risk of job losses from automation. There are however some notable exceptions. For example, six Australia regions (7% of total regions) lost jobs between 2006 and 2016 predominantly in less risky occupations. These include Northern Territory-Outback (Northern Territory), West and North West (Tasmania), South Australia-Outback (South Australia), Queensland-Outback (Queensland), Brisbane-West (Queensland), and Far West and Orana (New South Wales).

Labour and skills shortages are an issue in Australia, and they risk being exacerbated by COVID-19

The 2018 Manpower Group Talent Shortage Survey reported that about 34% of employers in Australia could not find the talent they needed. The number was higher for medium-sized organisations (50-249 employees), standing at 43% in 2018. However, the share of employers reporting shortages was lower in Australia than around the world on average (45%). Despite declining over the past decade, the share is still higher than in 2006, when it stood at 32%. One in four employers reported that the lack of applicants was the main reason why they could not find the skills they needed. As companies digitalise, automate and transform, finding candidates with the right blend of technical skills becomes more important than ever. Yet, many employers reported the lack of required hard skills as the driver of talent shortage (21%).

COVID-19 will likely accelerate changing demand for skills and employer expectations in Australia. The pandemic will have different impacts on workers across the skills distribution, and there is a risk that it will exacerbate inequalities in the labour market where there is an acceleration in trends towards digitalisation. After falling across all skills categories throughout the year, job vacancies, as measured by the Internet Vacancy Index (IVI), started to rebound in August 2020, with higher-skill workers experiencing stronger gains. By October 2020, the number of job vacancies exceeded pre-pandemic levels across Australia and across skill groups. However, the pandemic-induced labour market shock will leave a lasting impression on the economy and many employers are likely to raise skill requirements for certain jobs given the trend towards digitalisation.

Adult learning and digital skills will become even more crucial in a post pandemic labour market. Investments today in lifelong learning and vocational training can help workers and regions to make transitions to new economic opportunities. Australian adults have a strong set of digital skills, compared to the OECD average, according to the OECD's Survey of Adult Skills (PIAAC). Australian adults have above average proficiency in problem-solving in technology-rich environments, with about 40% scoring in the top two levels, compared to about 30% on average across the OECD. Burning Glass (BG) data shows that within Australia there is a substantial difference at the local level in the demand for digital skills, which emerges from job vacancies requiring digital skills. For example, vacancies linked to ICT specialist jobs are heavily concentrated within New South Wales, and specifically Sydney, being the city where more than 40% of total jobs are advertised. The future of work requires workers to develop a broad mix of skills, including not just digital skills but also strong basic, cognitive and socio-emotional skills, to succeed in the workplace.

The Australian Government has developed a comprehensive framework to prepare people, places and firms for the future of work

The Australian Government has taken immediate action to support Australians during the COVID-19 pandemic. The health response to the pandemic has been guided by the Australian Health Sector Emergency Response Plan for Novel Coronavirus (COVID-19 Plan), designed to support and help co-ordinate government health agencies. The government has introduced economic stimuli to provide timely support to affected workers, businesses and the broader community. Since the onset of the COVID-19 pandemic, the government has provided AUD 257 billion in direct economic support to cushion the blow and strengthen the recovery. It has done so for example through the JobKeeper Payment scheme, a subsidy for businesses significantly affected by COVID-19, the Boosting Cash Flow for Employers programme, providing payments to help keep businesses operating, pay rent, electricity and other bills and retain staff. In addition, the government has provided income support to Australians, through the Coronavirus Supplement and AUD 750 payments to those on certain forms of income support.

The Australian Government has invested AUD 48.3 million to establish the National Skills Commission (NSC), which develops intelligence on Australia's labour market, as well as current and emerging skills needs. The NSC will drive long-term improvements across the skills system by bringing together existing data to develop new capabilities in skills analysis which will improve VET pricing and outcomes. The *National Skills Commissioner Bill 2020* established a new statutory position: the National Skills Commissioner. The Commissioner performs an advisory function by providing advice on Australia's employment and educational workforce needs; VET performance, course prices and government investment returns; and opportunities to improve VET access and choice in regional, rural and remote areas.

A number of other initiatives and reforms have also been implemented to help workers transition. For example, the Local Jobs Program, where Employment Facilitators will work with employers and other key stakeholders to develop employment solutions at the local level and support Australians back into work. The programme focuses on re-skilling, up-skilling and employment pathways to assist people to move back into jobs as the economy recovers. In addition, employment services are being transformed in Australia to deliver better services to job seekers and employers and a better system for providers, capitalising on the potential of digital technologies. The development of the new employment services model involved extensive consultation with more than 1 400 stakeholders including job seekers, employment services providers, industry representatives, employers and peak bodies, and independent advice delivered by the Employment Services Expert Advisory Panel to the government.

What are the policy opportunities for Australia going forward?

Supporting skills development and job transitions into the future of work

Digitalisation, automation and new technologies are more likely to change tasks within jobs rather than replace entire jobs. Few occupations will be heavily affected by automation, but many more will face significant change. These changes in the task composition of occupations require workers to access re-skill and up-skill opportunities to stay relevant in their current job or transition into new jobs. The future of work will require a mix of digital skills, which are becoming even more relevant in light of COVID-19, as well as inter-personal skills and new occupation-specific competences. Supporting mid-career job transitions, re-skilling, up-skilling and training programmes will be crucial for supporting job transitions.

Some segments of the population will be hit harder than others by changes in the world of work. This study has shown that men tend to be employed more in occupations facing a higher risk of automation than women. Although more personal service jobs, which tend to be female-dominated, are at high risk of becoming automated than any other occupation, men are over-represented in other occupations facing a high risk of automation, such as drivers and mobile plant operators, and building and related trades workers (excluding electricians), and labourers in mining, construction, manufacturing and transport. Older workers and young people also typically face a more challenging labour market. Older people who have traditionally worked in a specific occupation will encounter more difficulties in transitioning to new jobs. Young people on the other hand tend to be in less stable employment contracts in Australia as well as across OECD countries. Indigenous Australians often work in jobs requiring lower skill levels, which face the highest risk of being automated over the long-term. They have lower employment shares than the rest of the population in occupations such as Managers and Professionals, while they have higher employment shares in Machine Operators, and Driver and Labourer occupations.

While Australian adults are more likely to continue in education and training after leaving formal education than their peers in other countries, there are disparities in access to training in Australia. Australian adults have a strong set of digital skills, compared to the OECD average, according to the OECD's Survey of Adult Skills (PIAAC). They have above average proficiency in problem-solving in

technology-rich environments, with about 40% scoring in the top two levels, compared to the OECD average of about 30%. Australia also outperforms the OECD average in adult literacy and numeracy proficiency. There are however differences in adult training participation in Australia based on a number of socio-economic characteristics. For example, adults aged 55+ are less likely to participate in training than the rest of the population. In addition, those with less than high school education are about half as likely to participate in training than adults with above high school education.

There is an opportunity to leverage local action in Australia and support people to transition into the future of work. This would be particularly important for more disadvantaged segments of the labour market, including Indigenous people, immigrants, persons with disabilities as well as older workers. At the local level, worker engagement is also an important element to ensure a people-centred policy response to the future of work. The social economy could play a key role in supporting disadvantaged groups.

Recommendations to support people for the transition to the future of work

Promote training opportunities across segments of the population

- *Consider the introduction of individual learning schemes*. These would help people continuously train throughout their working lives and at their own pace. The goal of these schemes is to boost individual choice and responsibility. A characteristic of such schemes that has made them attractive, given the current changes and disruption in the labour market, is their ability to make training rights "portable" from one job or employment status to the other, thereby linking training to individuals rather than to jobs.
- *Ensure workers most in need receive targeted support to re-skill and up-skill*. As the labour market changes, employment services will need to serve not just the long-term unemployed and those facing barriers to the labour market, but workers affected by labour market disruptions and technological change. Technology-driven labour market disruptions can be a driver of productivity and economic growth, and can present an opportunity to augment jobs rather than displace them. However, in order to fully reap the benefits, workers need to take advantage of training opportunities targeting workers most in need exist, such as the Skills Checkpoint for Older Workers Program and the Skills and Training Incentive, targeting workers aged 45-70. Further measures, for example in support of low-skill workers as well as workers from sectors at risk of automation or hard-hit by COVID-19 could be introduced.
- *Support the emergence of local partnerships for skills development*. Investing in mid-career job transitions, re-skilling and up-skilling will be crucial to preparing workers for the future of work. Businesses and government should work together at the local level to develop practical solutions and help workers transition to the jobs of tomorrow. Co-designed and co-funded training programmes as well as online learning platforms could play an important role.

Future-proofing places building on local assets

Industrial policy has been at the heart of the policy debate to prepare for the future of work across many OECD countries. As discussed in Chapter 4 of this publication, the tradable sector is recognised as a driver of productivity growth, but jobs in this sector typically face a higher risk of automation, as they entail routine and repetitive tasks. Policy makers need to embrace the long-term benefits from shifting towards the tradable sector as productivity growth can lead to better wages and standards of living, while also addressing the risks related to automation that come from this shift. In the context of the future of work, policies can look within the tradable sector and identify how to steer support towards occupations

with tasks that are less vulnerable to automation. Given that industrial and skills development policies often pertain to different government departments, policy co-ordination is crucial.

Local policy makers could build on the skills and competences of their population and on the presence of key actors in employment and skills. The so-called local skills ecosystems can be instrumental in providing access to relevant specialised knowledge and skills. There may be benefits to focusing on local expertise and strengths with the objective of creating a diversified labour market. Local skills ecosystems are typically characterised by a high level of social capital and strong multi-sector linkages between employment services, training organisations, as well as economic development actors, providing local firms with easy access to specialised support for fostering innovation. The emergence of a local skills ecosystem is often dependent on a strong anchor institution, such as a higher education or vocational education institution as well as a catalyst for change that unites different local actors. In addition to promoting digital skills, local actors can also lead the way in closing the digital divide between urban and rural areas by ensuring adequate access to high-speed broadband in rural areas.

Building on local skills ecosystems, policies could promote diversification into activities that are closely related and connected to the existing skills base of the population. As communities respond to structural adjustments resulting from automation, evidence suggests that local networks connecting industries with overlapping skill requirements are predictive of where firms are most likely to diversify economic activities. Successful examples of this diversification approach can be found in Ohio (United States), as well as across the European Union (EU) through the Smart Specialisation Strategy approach. These examples are presented in Chapter 4. More recently, Germany has agreed to a EUR 2 billion (about AUD 3.2 billion) aid package to help its carmakers and auto industry suppliers' transition into greener engines and automated driving. Under this programme, which is due to come into force in 2021, the government plans to distribute grants to important industry players by 2024. It will also use the funds to promote research and development in areas including the digitalisation of supply chains, 3D-printing and the shared use of production data, and give support to clusters of companies to train employees. The programme is part of Germany's economic stimulus plan aimed at cushioning the effects of the COVID-19 crisis.

Recommendations to future-proof places building on local assets

Promote economic diversification building on local skills ecosystems

- *Strengthen programmes with sector-focused training*. New South Wales has introduced the Infrastructure Skills Legacy Program (ISLP), to ensure workers develop the skills needed for local jobs in infrastructure. Victoria has adopted the Skills First programme to provide skilled workers needed in six sectors identified for major growth. There is an opportunity to mainstream this sectoral approach to skills development programmes in key sectors for the local economy across other states and territories.
- *Facilitate transitions towards sectors facing a lower risk of automation, building on the existing skills base of the local population*. For some workers, developing completely new skills can be challenging, for example if they have been doing the same job throughout their entire work life. The establishment and promotion of sectoral networks can help to identify opportunities to build on the existing skill base of the labour market to shift employment towards occupations facing a lower risk of automation.

Ensuring SMEs can access training opportunities

SMEs represent the backbone of the Australian economy, and they have been hit harder than larger firms by COVID-19. SMEs account for about 99.8% of all businesses (more than 2 million units), slightly higher than the OECD average. The pandemic has caused SMEs to suffer more than larger firms, both in Australia and across the OECD. In the Australian context, a number of surveys have shed light on the particular difficulties for small businesses in light of COVID-19. For example, a survey undertaken by American Express finds that 80% of small business owners are optimistic that they will survive the crisis in Australia, but 52% fear that sales will not bounce back strong enough to survive in the longer term.

SMEs struggle more than other firms in accessing training and embracing new technologies. The COVID-19 crisis has heightened the importance of SME digitalisation, and has served as an accelerator. Limited access to training is generally due to the lack of dedicated internal training or Human Resources departments to organise and co-ordinate training. SMEs tend to have lower levels of management skills and practices, suggesting that even when employee skills are developed, these may not be used effectively. High direct financial costs for developing tailored training are another typical constraint for SMEs when it comes to training. Within Australia, adults working in micro and small enterprises are less likely to participate in training than those working in medium-sized firms (56.1%, 64.4% and 75.4% respectively), although those least likely to participate in training are adults working in large firms (45.9%). In addition, there are large barriers for many SMEs to adopt digital technologies, reflecting challenges such as relative difficulty accessing finance or a lack of key capabilities. The slow adoption of digital technology might also be a reflection of the lower incentives for some SMEs who might not be able to reap the same pay-offs from the digitalisation of their production processes as larger businesses.

Australia has introduced measures to support access to training for firms. The Australian Government has a dedicated webpage, providing information on support and incentives. There is a focus within Australia on supporting firms in providing apprenticeship opportunities. For example, the Australian Apprenticeships Incentives Program (AAIP) contains a range of direct payments to support employers. In light of the pandemic, the government has also introduced the Boosting Apprenticeship Commencements programme, supporting firms to take on new apprentices and trainees. In addition, the Support for Adult

Australian Apprentices (SAAA) incentive is a payment of AUD 4 000 to an eligible employer of an adult Australian Apprentice once the apprentice has successfully completed 12 months of training.

Australia could consider taking measures in support of employee training as well as towards the creation of employer-led networks for skills development at the local level. Given the constraints faced by smaller firms in accessing trainings, incentives can be even more effective in the context of SMEs. Across the OECD, employees in small firms are 50% less likely to be offered formal training than those in larger firms. The creation of networks of businesses within the same sector or partnerships among SMEs can play a crucial role in helping SMEs navigate labour market changes and get easier access to skills development information and opportunities. Several OECD countries are investing more in "brokers" or intermediary bodies such as collective training offices to organise training for groups of SMEs to shift the burden away from individual employers. These organisations often sign apprenticeship contracts with the government while also providing practical assistance to individual apprentices.

Recommendations to ensure SMEs can access training opportunities

Support SME workforce training

- *Raise awareness of training among SMEs*. The COVID-19 crisis has heightened the importance of SME digitalisation, and served as an accelerator. The Australian Government could further raise awareness among SMEs of the importance of assessing their training needs and undertake workforce training accordingly. The government could also raise awareness of the available programmes in support of SME training,
- *Consider developing measures to incentivise SME training*. The government could consider providing grants to SMEs, in order to undertake workforce training. The government could look to the design and impact of similar programmes implemented in other OECD countries. These include the Canada Job Grant (CJG), a funding programme designed to reduce the costs of providing third-party skills training to new and existing employees, and the competence training voucher, supporting both small and large firms in employee training, and helping workers adapt to changing skills in the labour market in Lithuania.
- *Promote the emergence of SME networks for skills development*. The creation of networks and partnerships between SMEs can play a crucial role in helping them navigate labour market changes and get easier access to skills development information and opportunities. Australia could draw on the example of Skillnet Ireland.

Encourage better use of skills in the workplace

- *Support the adoption of high-performance work practices (HPWPs)*. HPWPs refer to a set of human resources practices associated with greater skills use and informal learning. HPWPs include aspects of work organisation and job design (such as teamwork, autonomy, task discretion, mentoring, job rotation, applying new learning), as well as management practices (such as employee participation, incentive pay, training practices and flexibility in working hours). The government could raise awareness of the beneficial impact for firms of adopting HPWPs and encourage them to assess their practices and adopt HPWPs.

2. The local impacts of automation in Australia

COVID-19 has put pressure on regional labour markets in Australia, as it has around the world. The number of employed people dropped by almost a million between March and May 2020. Employment started to rebound in June 2020 and total employment across Australia recovered to pre-pandemic levels by February 2021. COVID-19 is also likely to accelerate the adoption of automation, as firms seek to increase their productivity. The risk of automation varies at the local level in Australia, with some regions more at risk than others. This chapter looks at how automation could impact people and places across Australia, with a special focus on the regions of Sydney-South West (New South Wales) and Warrnambool and South West (Victoria).

In Brief

Automation will have different impacts on local labour markets in Australia, likely accelerated by COVID-19

- **COVID-19 has hit labour markets in Australia as around the world**. The number of employed people in Australia dropped by almost a million between March and May 2020. A gradual recovery started in June and continued in the following months. In February 2021, total employment in Australia reached its pre-pandemic level at 13 million. The participation rate, reflecting the share of working age population participating in the labour market, has increased after a drop in the immediate aftermath of the pandemic. As of June 2021, unemployment rates dropped below pre-pandemic levels across most states and territories, partly reflecting improving participation rates as more and more people re-enter the labour market in Australia, either with a job or looking for one.
- **The risk of automation varies at the local level in Australia, with COVID-19 likely to accelerate automation in the workplace**. Australia overall faces a lower risk of losing jobs to automation than on average across the OECD (about 36% vs. 46%). However, regional differences in the risk of automation exist within all Australian states, with some showing higher regional variation than others. For example, in Queensland, the risk of automation varies from 41.2% in Mackay - Isaac - Whitsunday to 27.7% in Brisbane Inner City.
- **The drivers of the risk of automation depend on the occupational profile of local labour markets**. In rural regions, the risk of losing jobs to automation relates to the prevalence of low-skilled occupations in Agriculture. This is the case of South Australia-South East (South Australia), where 40.3% of jobs are at risk. In some regions, the risk is driven by occupations which are common to the Mining sector, such as in Mackay-Isaac-Whitsunday (Queensland). Regions at risk of automation also tend to have high employment shares in Manufacturing. Other regions are characterised by the prevalence of jobs in occupations at risk across sectors.
- **Sydney-South West (New South Wales) and Warrnambool and South West (Victoria) are examples of two regions at high risk for different reasons**. Sydney-South West is characterised by a diversified local economy, with the high risk of automation deriving from high employment shares in a range of occupations at high risk. In Warrnambool and South West, Agriculture is the largest employer and drives the risk of automation. Both regions have shifted towards occupations at lower-risk of automation between 2006 and 2016.

Introduction

Megatrends related to digitalisation, automation and artificial intelligence (AI) are having a profound impact on local labour markets across the OECD. Some people and places are more at risk than others. The COVID-19 pandemic is posing unprecedented challenges to local labour markets in Australia, and accelerating a pre-existing trend towards automation. This chapter is structured as follows. Section 2.1 provides an overview of local labour market trends in Australia. Sections 2.2 and 2.3 analyse the impact of automation at the local level in Australia. Section 2.4 dives into the characteristics and impacts of automaton in two case study regions: Sydney-South West (New South Wales) and Warrnambool and South West (Victoria).

2.1. COVID-19 is posing unprecedented challenges to local labour markets, but Australia remains resilient

2.1.1. COVID-19 hit some places harder than others

The first COVID-19 case was confirmed in Australia in late January 2020. As of August 2021, the total number of COVID-19 confirmed cases in Australia stands at about 49 000, with the highest numbers being reported in New South Wales (22 000) and in Victoria (21 000). Since the start of the pandemic, states and territories in Australia have alternated periods of tightening and easing of restrictions, mirroring the changing spread of the virus at the local level. The number of new cases initially grew sharply in Australia, then levelled out at about 350 per day and started falling at the beginning of April 2020 to under 20 cases per day by the end of the month. A second wave of infections in Victoria commenced in late June 2020, leading to new localised lockdowns and the declaration of state of disaster in Victoria. In mid-September, Victoria introduced a roadmap for reducing restrictions and, at the end of October, the state recorded zero new COVID-19 cases and deaths for the first time since June 2020. In November and December 2020, local COVID-19 outbreaks were identified in South Australia and New South Wales, leading to the re-imposition of localised restrictions. Localised restrictions in response to local outbreaks were introduced in Western Australia and Victoria in January and February 2021. COVID-19 hit Australia immediately after its worst bushfire season, which ravaged homes, businesses, and entire towns across the country between 2019 and 2020.

The pandemic had an immediate impact on the Australian labour market, hitting vulnerable segments of the population more than others. Employment fell by over 857 000 jobs from March to May 2020. Data from the National Skills Commission (NSC) shows that young people were greatly impacted by COVID-19, with youth employment declining by 107 400 in May 2020 following a record decrease of 214 500 in April 2020. Young people accounted for about 45% of the total decline in employment in May, despite representing only 16% of the population. Since then, youth employment has rebounded somewhat to 1.9 million in June 2021, which is still slightly lower than the level recorded in March 2020. There was also a decrease in female employment, falling by 143 700 jobs in May following a fall of 327 700 in April (this being the largest monthly decline on record) (National Skills Commission, 2020[1]). Initially, COVID-19 had a disproportionate impact on women, due to their over-representation in industries that were most severely affected, such as accommodation and food services, and the fact that they were more likely to be employed on a casual basis, where job losses have been greater (National Skills Commission, 2020[2]). During COVID-19, many workers have experienced a decline in working hours, which fell by a record 163.9 million hours between March and April 2020. The decline in working hours also disproportionately affected working women (Australian Bureau of Statistics, 2020[3]). By February 2021, female employment increased to 6.2 million, which is above the level seen just before the pandemic.

A report released by the Australian Government National Skills Commission showed the immediate impacts of COVID-19 on business activity and confidence. Results of a survey of more than 250 businesses undertaken between 27 March and 3 April 2020 showed that the COVID-19 crisis affected the majority of businesses with the demand for their goods and services and cash flow considerably reduced. Consequently, many businesses reported reducing staff hours or letting staff go. Some 58% of businesses reported that COVID-19 had affected their business ‘a great deal’ with another 22% reporting it affected their business ‘somewhat’. The most commonly reported impacts of the COVID-19 pandemic were a lower demand for goods and services (67% of impacted businesses), cash flow issues (37%) and having to change business practices (33%) (Australian Government Department of Education, Skills and Employment, 2020[4]).

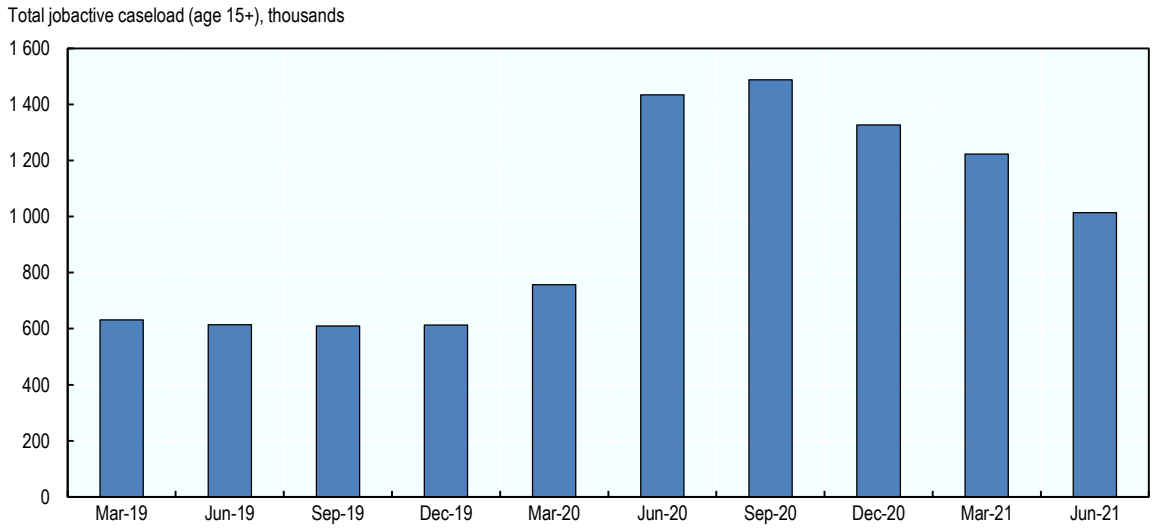
COVID-19 had different impacts at the local level in Australia throughout 2020. Some jurisdictions were more severely affected than others due to a range of factors, including ongoing COVID-19 cases,

each jurisdiction's industry composition, demographics (population size and age structure) and differences in the way each state and territory has managed the pandemic (National Skills Commission, 2020[2]). For example, between March and May 2020, the unemployment rate increased by more than 2 percentage points in Western Australia, while it increased by less than 1 percentage point in the Australian Capital Territory. Not surprisingly, reflecting the outbreak of COVID-19 cases in Victoria from late June 2020 and the subsequent restrictions, labour market indicators in Victoria worsened in the following months, with the unemployment rate hitting 7.3% in October 2020. Payroll and wage data, collected through the Weekly Payroll Jobs and Wages in Australia series, also add to the regional variation of labour market conditions in Australia throughout the pandemic. For example, between 1 February and 25 April 2020, Bunbury (WA) was the region experiencing the largest decline in payroll jobs (-9.4%), followed by South East (TAS) (-9.3%) and Gold Coast (QLD) (-9.1%). Payroll jobs returned to their pre-pandemic levels in most regions by the first quarter of 2021.

The jobactive caseload, which includes people participating in the New Employment Services Trial, dramatically increased in the first half of 2020 as a consequence of COVID-19. jobactive and the New Employment Services Trial are employment programs managed by the Australian Government. They are a network of employment service providers operating in 1 600 locations across Australia. Under jobactive and the New Employment Services Trial, job seekers receive assistance to improve their job readiness, and employability skills and employment applications. Service providers match job seekers with suitable work experience placements, including through compulsory activities such as the Work for the Dole program. The development of the new employment services model involved extensive consultation with more than 1 400 stakeholders including job seekers, employment services providers, industry representatives, employers and peak bodies, and independent advice delivered by the Employment Services Expert Advisory Panel in its report to Government. The new model is being trialled in two regions from July 2019 before being rolled out nationally from July 2022. The total jobactive caseload, which includes people participating in the New Employment Services Trial, reached a record high of 1.434 million people in the second quarter of 2020, up from 757 316 in the previous quarter. The caseload continued to increase in the third quarter, standing at 1.488 million, before declining to 1.326 million in the last quarter of 2020. The second quarter 2021 active caseload, however, remained almost double that of fourth quarter 2019 (see Figure 2.1).

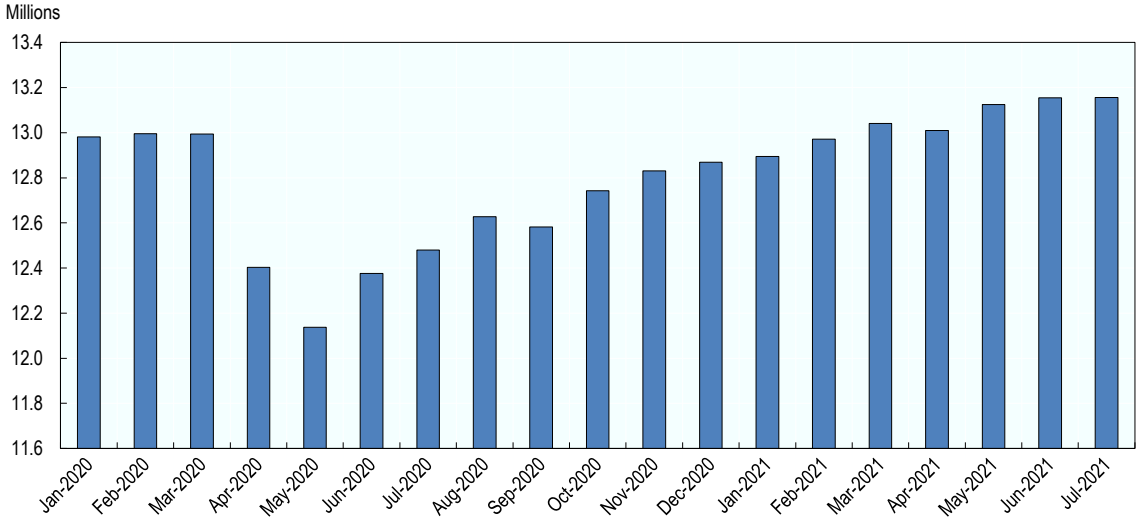
From June 2020 onwards, Australia started experiencing gains in total employment, and by March 2021, it was back to pre-pandemic levels (see Figure 2.2**)**. While employment fell by 856 900 between March and May 2020, it increased by 1 million over the following 13 months. Signs of recovery in the labour market also emerged from increasing participation rates and employment rates in Australia. As more people re-entered the labour force, Australia's unemployment rate initially increased, reaching a peak of 7.4% in July 2020, before starting to decline. As of July 2021, unemployment rates dropped below pre-pandemic levels in all states and territories except the Australian Capital Territory (see Figure 2.3).

Figure 2.1. The total jobactive caseload almost doubled in light of COVID-19 and is now steadily declining



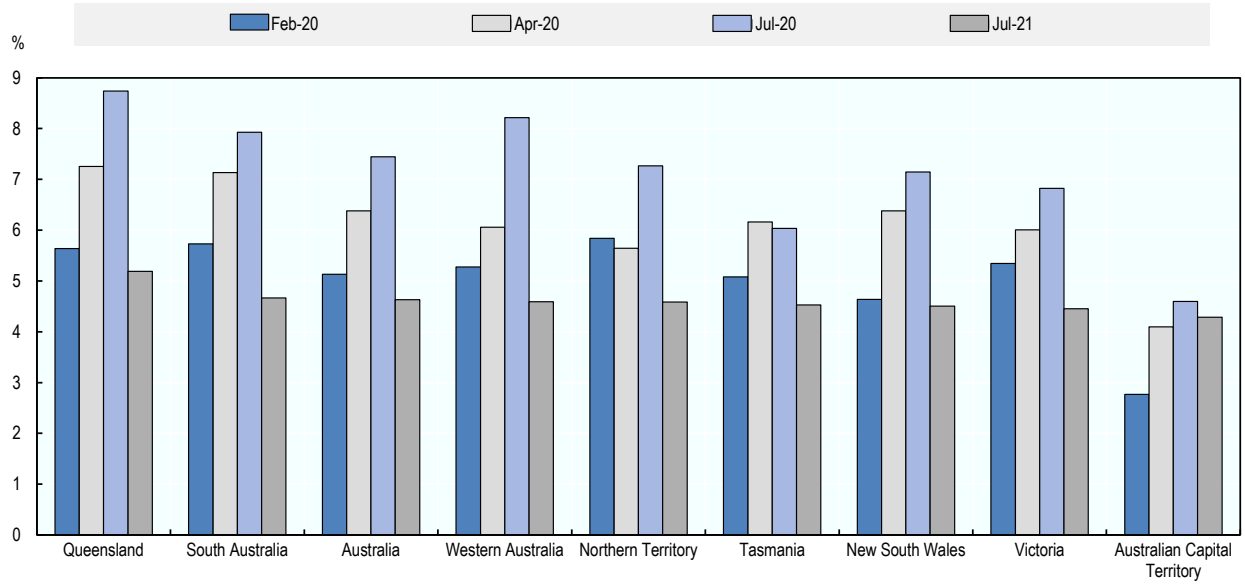
Source: jobactive Caseload Data, Australia Labour Market Information Portal.

Figure 2.2. Total employment in Australia started growing in June 2020 and recovered to pre-pandemic levels by February 2021



Source: Australian Bureau of Statistics (ABS), Labour Force Survey, July 2021.

Figure 2.3. Unemployment rates recovered to pre-pandemic levels across most Australian states and territories



Source: Australian Bureau of Statistics (ABS), Labour Force Survey, July 2021

Box 2.1. Government support for businesses, employees and job seekers during COVID-19

The Australian Government has announced a suite of measures to support businesses, employees and job seekers during the COVID-19 pandemic. As an example, the JobKeeper Payment scheme was introduced to provide a temporary subsidy for businesses significantly affected by COVID-19. Eligible employers, sole traders and other entities can apply to receive AUD 1 500 per eligible employee per fortnight. On 21 July, the government announced proposed changes to JobKeeper including an extension through to 28 March 2021. From 28 September 2020, eligibility for the JobKeeper Payment was based on actual turnover in the relevant periods. The payment has also been stepped down and is paid at two rates. Further changes were announced on 7 August 2020 to adjust the reference date for employee eligibility and make it easier for organisations to qualify for the JobKeeper Payment extension from 28 September 2020.

In addition, temporary cash flow payments up to AUD 100 000 have been made available to keep eligible small to medium-sized businesses operating, paying bills and retain staff. Under the Coronavirus SME Guarantee Scheme, the government is providing a guarantee of 50% to SME lenders to support new short-term unsecured loans to SMEs. This aims to provide businesses with funding to meet cash flow needs, by further enhancing lenders' willingness and ability to provide credit. A safety net will apply to lessen the threat of actions that could unnecessarily push businesses to being wound up or forced into insolvency or bankruptcy during this time. Finally, the instant asset write-off threshold has been increased from AUD 30 000 to AUD 150 000 for businesses with an aggregated annual turnover of less than AUD 500 million, with the objective of supporting business purchase of new equipment. This applies from 12 March 2020 until 30 June 2021, providing the asset is purchased by 31 December 2020.

As the economy recovers from COVID-19, the Australian Government has introduced other measures to support skills development and job creation. As an example, in July 2020, the Australian Government announced the establishment of a new AUD 1 billion JobTrainer fund to give hundreds of thousands of Australians access to new skills by retraining and upskilling them into sectors with job opportunities. In partnership with the states and territories, more Australians will have access to free, or low cost, training places in areas of identified skills. This includes AUD 500 million from the Australian Government in 2020, with a matched contribution being sought from state and territory governments. The JobTrainer fund will provide for around 320 000 additional training places to help school leavers and job seekers gain the skills they need to get a job.

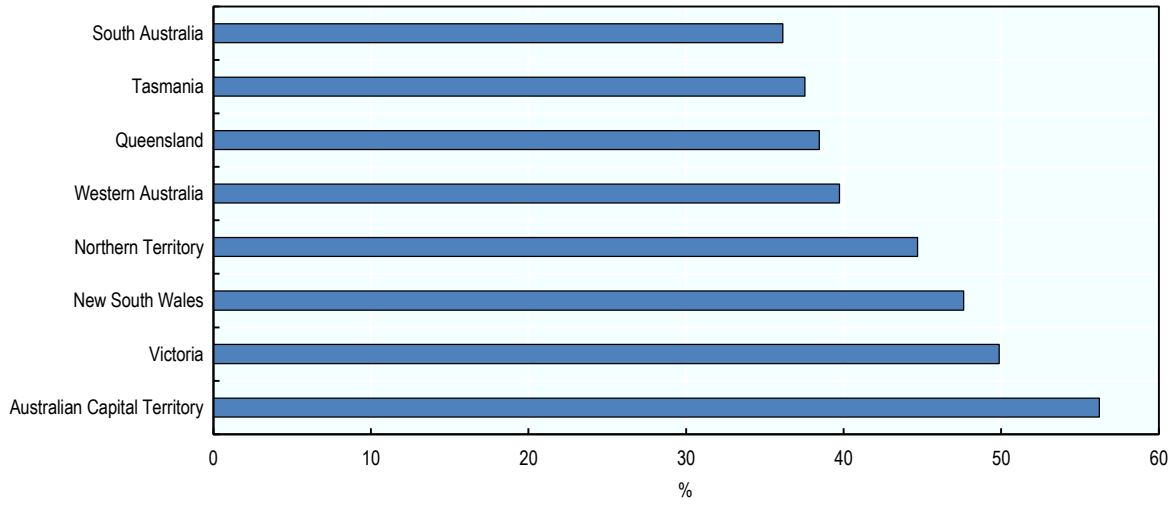
Source: Department of Education, Skills and Employment (2020[4]; 2020[5]), Australian Government Treasury (2020[6]).

Going forward, the economic consequences of the pandemic are likely to affect some sectors more than others, with tourist destinations and large cities particularly affected. Across the OECD, regions have different sectoral specialisations, exposure to global value chains, focus on tradable vs. non-tradable sectors, and shares of non-standard employment. Consequently, some regions are likely to suffer more than others, facing a steeper economic recession and larger shares of jobs at risk. OECD estimates show that the risk is high in most Australian states, while it is slightly lower in the Northern Territory. The estimates refer to activities directly affected by the shutdowns, but a significant share of those may still be at risk even after the pandemic is under control (OECD, 2020[7]). The need to quickly reallocate workers from shrinking to expanding industries is a more important aspect of the current episode than other downturns (Borland, 2020[8]).

COVID-19 has led to a substantial shift towards teleworking in Australia as across the OECD, but the ability to perform jobs remotely varies at the local level. Teleworking –"work-from-home" or "home-office" – has been a necessary practice for many firms and workers during the lockdown period of the COVID-19 crisis. Communities have undergone a large scale "forced experiment" where sectors, firms and workers have continued to operate while being physically separated, provided they had the necessary technological, legal and digital security conditions (OECD, 2020[9]). The potential of teleworking varies greatly both between and within countries, depending on the occupational profile of local labour markets (OECD, 2021[10]). Across the OECD, the possibility of remote working correlates strongly with the skills requirement of the occupation. As a result, rates of potential remote working across regions reflect the skill composition of the local workforce. Other factors also come into play, such as the industrial composition of local economies (OECD, 2020[11]). Looking at Australia, OECD work shows that the Australian Capital Territory has the highest share of jobs that can potentially be performed remotely (56.2%), followed by Victoria (49.9%) and New South Wales (47.6%). On the other hand, only 36.1% of jobs can be performed remotely in South Australia (OECD, forth.) (see Figure 2.4). Even though a job may be amenable to teleworking, the worker, in all likelihood, must still have adequate access to a sufficiently fast internet service. If not, this creates a digital divide between urban and rural areas. Ensuring access to high-speed broadband in rural areas could help mitigate this divide (OECD, 2021[12]).

Figure 2.4. COVID-19 has highlighted spatial differences in the ability to perform remote working

Percentage of jobs amenable to remote working, Australian states and territories



Source: OECD (2020[13]), Regions and Cities at a Glance.

2.1.2. Local labour markets across Australia had experienced diverging trends before the pandemic

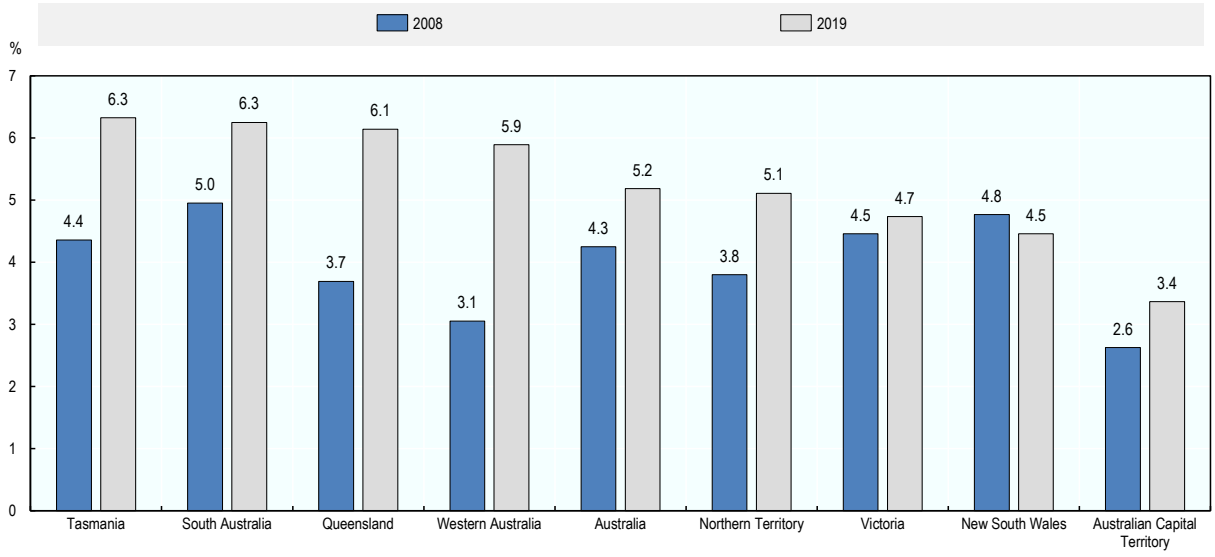
Before COVID-19, the Australian labour market witnessed positive developments, but the unemployment rate remained higher than the pre-Global Financial Crisis (GFC) level. OECD data shows that the labour force participation rate, accounting for labour force participants as a share of the working age (15-64 year -old) population, has been above the OECD average over the past decade, and amounted to 78.5% in 2019, compared to the OECD average of 72.8%. Total employment in Australia was 20% higher in 2019 than it was in 2008, compared to the OECD average increase of 10%, However, like many other OECD countries, Australia's unemployment rate in 2019 remained higher (5.2%) than before the 2008 GFC (4.2%).

The unemployment rate had increased in all Australian states and territories between 2008 and 2019, except for New South Wales (see Figure 2.5). Increases in the unemployment rate have coincided with improving labour force participation in Australia between 2008 and 2019. The labour force participation rate among the working age population (15-64 year old) increased from 76.5% to around 78.5% over that period. On average during 2019, the monthly unemployment rate stood at 6.3% in Tasmania and South Australia, while it was 3.4% in the Australian Capital Territory. Between 2008 and 2019, the unemployment rate increased in all Australian States except for New South Wales, where it decreased by about 0.3 percentage points. The increase in the unemployment rate was largest in Western Australia and Queensland, where it increased by 2.8 and 2.5 percentage points, from 3.1% to 5.9% and from 3.7% to about 6.1% respectively between 2008 and 2019. Over the last few decades, some states were consistently strong performers while others continued to face challenges in terms of high unemployment rates (OECD, 2019[14]). The large increase in the unemployment rate in Western Australia and Queensland was partly due to the ending of the Mining boom and its transition from an investment to production phase. The net-zero carbon transition could lead to more job losses in sectors such as mining, which may exacerbate existing regional labour market disparities (OECD, 2021[12]).

Regions within states and territories have experienced diverging trends, which reflect place-specific labour market dynamics (see Figure 2.6). For example, looking at New South Wales, the unemployment rate in 2019 was highest in Southern Highlands and Shoalhaven, standing at 8.5%, while it was lowest in Sydney – Sutherland, averaging 2.3% in the same year. Southern Highlands and Shoalhaven is also one of the few regions within New South Wales having witnessed an increase in unemployment between 2008 and 2019, by about 2.3 percentage points. Similar dynamics have taken place in other Australian states and territories, suggesting the importance of local labour market dynamics. As an example, in Victoria the unemployment rate was highest in Melbourne - North West, standing at 6.2% in 2019, and this is also the region that experienced the sharpest increase in the unemployment rate between 2008 and 2019 (+2.6 percentage points). On the other hand, Bendigo has among the lowest unemployment rates in Victoria and the rate has decreased by 3.7 percentage points between 2008 and 2019.

Figure 2.5. Before COVID-19, the unemployment rate increased in all Australian states and territories except for New South Wales between 2008 and 2019

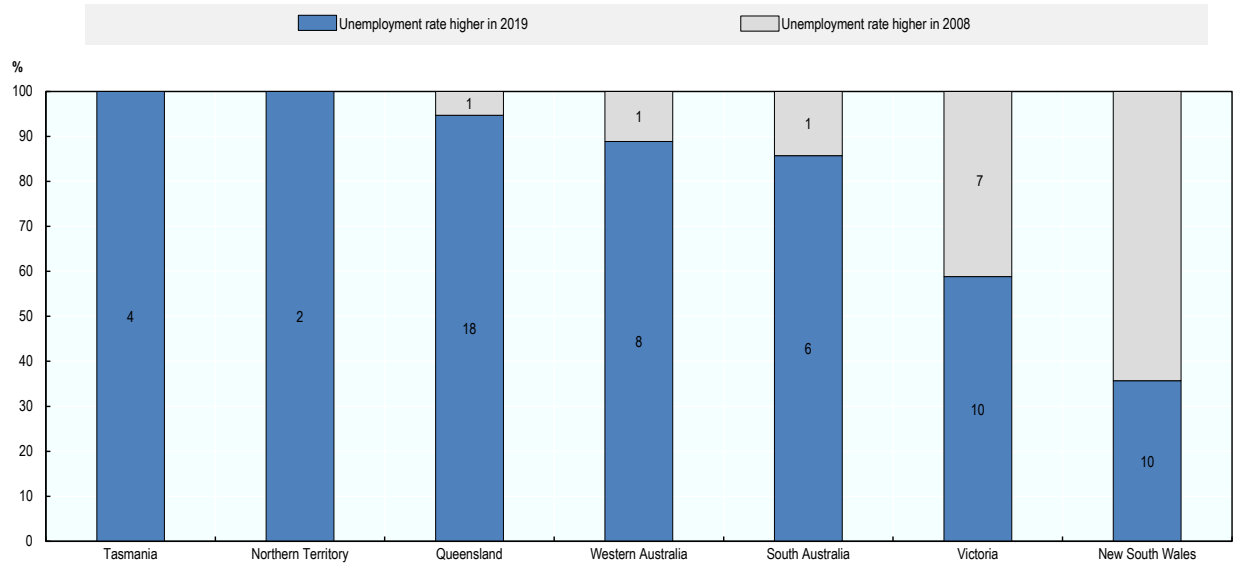
Annual unemployment rates, Australian States and Territories, 2008 and 2019



Note: Unemployment rates for 2008 and 2019 are averages of 12-month rates.
Source: Australia Bureau of Statistics.

Figure 2.6. Many Australian regions had not recovered in 2019 to pre-2008 unemployment rate levels

Share of regions within each State or Territory, with higher unemployment rates in 2019 and 2008



Note: The numbers in each column represent the number of SA4 regions within each State and Territory. Data does not include the Australian Capital Territory.
Source: OECD elaboration on Australian Bureau of Statistics Labour Force Surveys.

2.1.3. Prior to COVID-19, job creation had been driven by capital city regions

Most Australian states and territories have experienced employment growth in recent years (see Figure 2.7**).** Victoria, New South Wales, and Australian Capital Territory experienced the largest growth, with total employment growing by 16.7%, 14.1%, and 11.2% between February 2015 and 2020 (or 490 400, 511 800, and 23 600 jobs respectively). Total employment has grown more moderately in other states and territories. Employment growth was negative only in the Northern Territory (-1.7%).

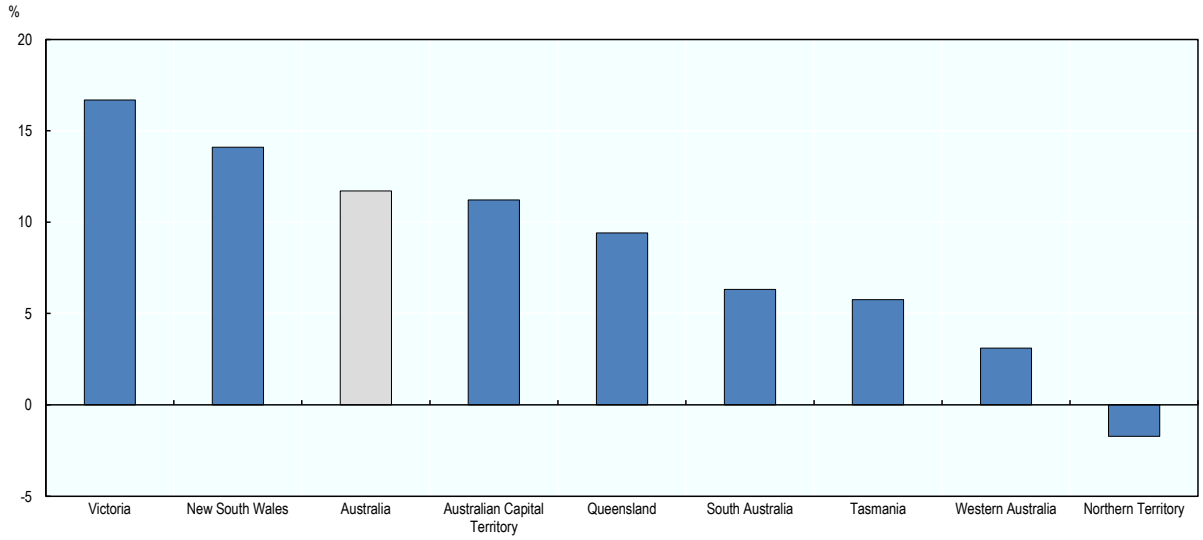
Employment dynamics however vary at the regional level, even within states and territories that have created jobs over the past years. For example, in New South Wales, Sydney-South West is the region that has experienced the largest employment growth over the past five years, adding about 56 000 jobs. This has been driven by sectors such as Retail Trade, Health Care and Social Assistance, Construction and Professional, Scientific and Technical Services. On the other hand, Coffs Harbour-Grafton has witnessed the sharpest job loss in New South Wales (-3 000 jobs), driven by losses in Agriculture, Manufacturing and Transport, Postal and Warehousing. Structural change is a driver of employment trends in regions, as regions dominated by services, especially knowledge-intensive ones, are likely to witness employment growth, while employment growth is likely to be lower and waning in regions dominated by goods-based industries (which are on a long term declining trend in Australia). In addition, employment trends have also been influenced by population trends. Sydney-South West is the region in New South Wales that has experienced the second largest population growth between 2015 and 2020 (13% or about 50 000 new residents). On the other hand, in Coffs Harbour-Grafton, population residents increased by only 3%, or 4 000 people, over the same period.

Job creation has been mainly driven by capital city regions within each state and territory (see Figure 2.8**)**. This can be explained by the fact that regions closer to capital cities have stronger access to skills, finance and capital, as well as better infrastructure and can easily capitalise on agglomeration

benefits. In Tasmania, Hobart accounts for 78.0% of net job creation (or 11 000 jobs) between 2015 and 2020. Similarly, in Western Australia, Perth-North West and Perth-South West account for 47.7% and 34.6% of net job creation over the same period, corresponding to about 19 400 and 14 100 jobs respectively. In South Australia, Adelaide-South and Adelaide-North created 37.5% and 31.6% of state employment (about 19 200 and 16 200 jobs).

Figure 2.7. Number of jobs increased in most states and territories over the five-year period leading up to the COVID-19 pandemic

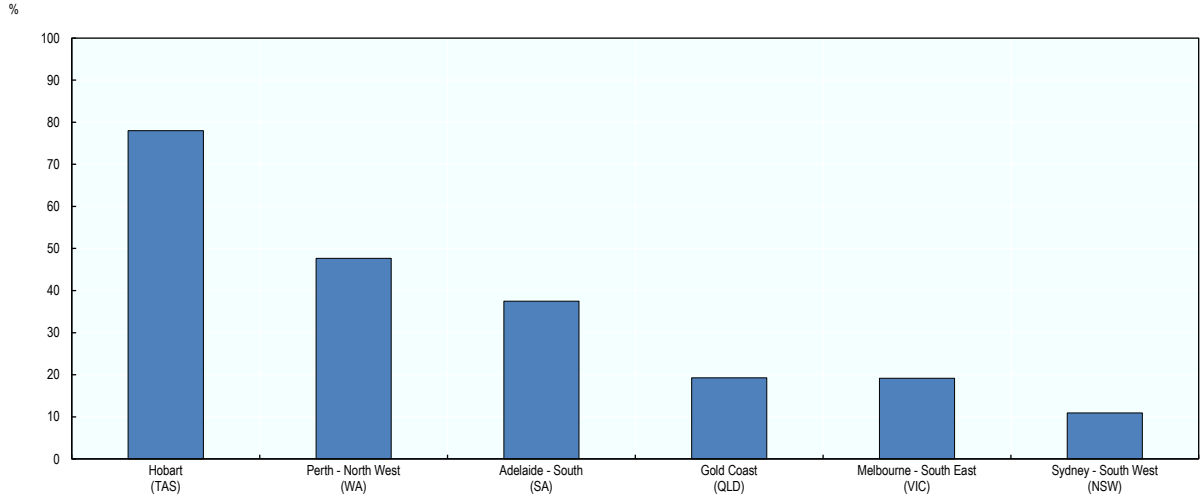
Total employment change, February 2015 to February 2020



Source: Australian Bureau of Statistics Labour Force Survey, four-quarter average.

Figure 2.8. Capital city regions have driven job creation in each state and territory

SA4 region within each state accounting for the largest share of job creation between February 2015 and 2020



Source: Australian Bureau of Statistics Labour Force Survey, four-quarter average.

2.1.4. The sectoral composition of the Australian labour market has changed over the past decades, but regional differences persist

As in all OECD economies, the sectoral composition of the economy has shifted dramatically over the long term, away from goods production and towards services (OECD, 2018[15]). With higher incomes, consumers typically spend a greater share of their income on services compared to goods, and changing consumer preferences and population ageing have also shaped demand. The shift to services - in particular business services – also reflects shifts in how goods are produced. Supply chains have lengthened with goods producing industries becoming more focused on core activities and outsourcing non-core activities, and production has become more fragmented across countries with the rise of global value chains (GVCs) (Adeney, 2018[16]) (Timmer et al., 2014[17]). As a consequence of falling international trade costs and the entrance of emerging markets such as China, a greater share of the production stages of supply chains now occurs overseas (Kelly and La Cava, 2014[18]). In addition to the progressive opening up of the economy to international competition, the decline in Manufacturing jobs has also been due to technological development (Garnett, 2018[19]). In Australia, the end of the Mining boom has been coupled with an ongoing decline in the Manufacturing industry, while the Construction and Services sectors have grown (OECD, 2018[20]).

The share of manufacturing employment in Australia has dropped over the past decades. It accounted for about 12.1% of total employment in Australia in the early 2000. The share of manufacturing employment dropped to 9.0% in 2010 and 7.1% in 2020 (see Figure 2.9). More than a million people were employed in Manufacturing in 2000, while about 923 000 were employed in this sector in February 2020, prior to the pandemic based on trend data from the Australian Bureau of Statistics Labour Force Survey. The contraction in Manufacturing employment may be attributed to a variety of factors, including the persistently high Australian dollar, increased competition from low cost countries such as China and India, and a switch to more capital intensive production processes (Georgeson and Harrison, 2015[21]), as well as high energy costs. Similarly, employment in Agriculture, Forestry and Fishing has halved since 2000, when it amounted to about 4.9%. In 2020, Agriculture employment stands at 2.5% of total employment in Australia. Australia envisions revitalizing its manufacturing base through its Modern Manufacturing Strategy to help manufacturing scale-up, become more competitive and resilient. The strategy involves getting the economic conditions right for business, making science and technology work for industry, focusing on areas of advantage, and building national resilience for a strong economy.

Health Care and Social Assistance has emerged as the largest sector, while other services sectors have also increased their share of total employment. These trends are broadly consistent with what seen in other high-income economies over recent decades. Health Care and Social Assistance accounted for 13.8% of total employment in February 2020, up from 9.3% in 2000 and 10.9% in 2010. Professional, scientific and technical services and education and training today employ 8.9% and 8.6% of total workers respectively, up from 6.5% and 7.1% in 2000. The relative importance of the construction sector has also grown, as it today employs 9.1% of total workers, up from 7.8% in 2000. Health care and social Assistance is also the largest sector by employment in all Australian states and territories, except for the Australian Capital Territory, where the largest majority of workers are employed in public administration. Over the same period, Education and Training and Professional, Scientific and Technical Services added 196 000 and 184 100 jobs respectively. Construction was also a sector that experienced employment growth, adding more than 160 000 jobs.

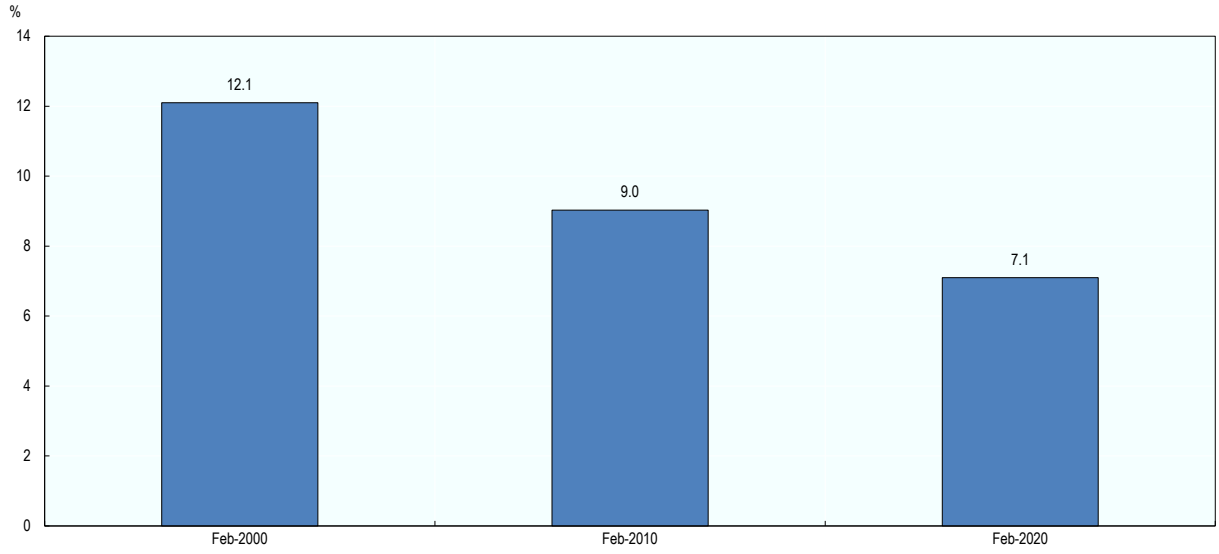
However, Manufacturing still represents an important source of employment in many regions across Australia, and it has been growing over recent years. For example, it accounts for 12.5% in Shepparton (Victoria) and 12.4% in Melbourne-South East (Victoria), which have added about 1 300 and 2 300 Manufacturing jobs over the past five years. Richmond-Tweed (New South Wales), where Manufacturing employment amounts to about 9.7% of total employment, has experienced the strongest Manufacturing job creation over the past five years, as Manufacturing employment has increased by 7 100.

Melbourne-South East accounts for about 4% of total Manufacturing employment in Australia, while the other three regions mentioned above account for 1% each. However, the net-zero carbon transition may lead to a number of manufacturing job losses which may contribute to regional labour market disparities (OECD, 2021[12]). Agriculture, Forestry and Fishing continues to represent a key source of employment in some regions. For example, it is as high as 31.2% of total employment in Queensland-Outback (Queensland) and 24.0% in Darling Downs-Maranoa (Queensland), 22.5% in Warrnambool and South West (Victoria) and 22.2% in Western Australia-Wheat Belt (Western Australia). Each of these regions accounts for about 4% of total Australian jobs in agriculture, forestry and fishing. These regions have experienced a net growth in Agriculture employment over the past five years, by 8 900, 9 000, 4 100 and 7 400 respectively.

Mining, accounting for about 1.9% of total employment nationally, is the main source of employment in some regions, which rely on resource extraction. It stands at about 21.5% of total employment (or 9 600 jobs) in Mandurah (Western Australia), 18.1% (or 19 800 jobs) in Western Australia-Outback (North and South) and 17.4% (or 15 600 jobs) in Mackay-Isaac-Whitsunday (Queensland).

Figure 2.9. Manufacturing employment has steadily declined in Australia

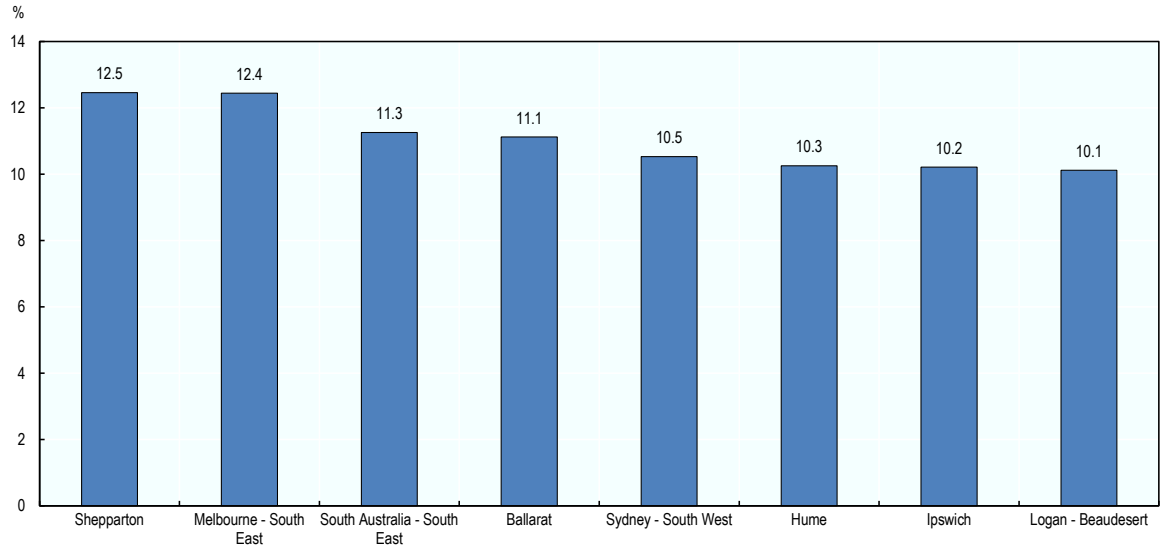
Manufacturing employment as a share of total employment, 2000, 2010 and 2020



Source: Australian Bureau of Statistics, Labour Force Survey – Employment by Industry time series.

Figure 2.10. In some regions, Manufacturing still accounts for more than 10% of total employment

Manufacturing employment as a share of total regional employment, selected regions, February 2020



Source: Australian Bureau of Statistics, Labour Force Survey – Employment by Industry time series, four-quarter average.

2.1.5. Labour productivity growth has slowed down, especially in some territories

Australia has a relatively high productivity compared to other OECD countries. Australian labour productivity in 2019 was over USD 55.05 per hour worked. This places Australia as being mid-range across the OECD. Top performing OECD countries include Ireland (USD 102.69 per hour), Luxembourg (94.75) and Norway (84.27). Australian productivity growth between 2001 and 2017 exceeded all G7 economies other than the United States. Capital deepening linked to the Mining boom is considered to be the largest driver of productivity growth in Australia (Australian Government Productivity Commission, 2019[22]). Catch-up to the productivity level of the United States has proven elusive over the past five decades, partly because of Australia's relative remoteness and low population density have been a barrier to achieving efficient scale in Manufacturing and goods distribution (Australian Government Productivity Commission, 2020[23]).

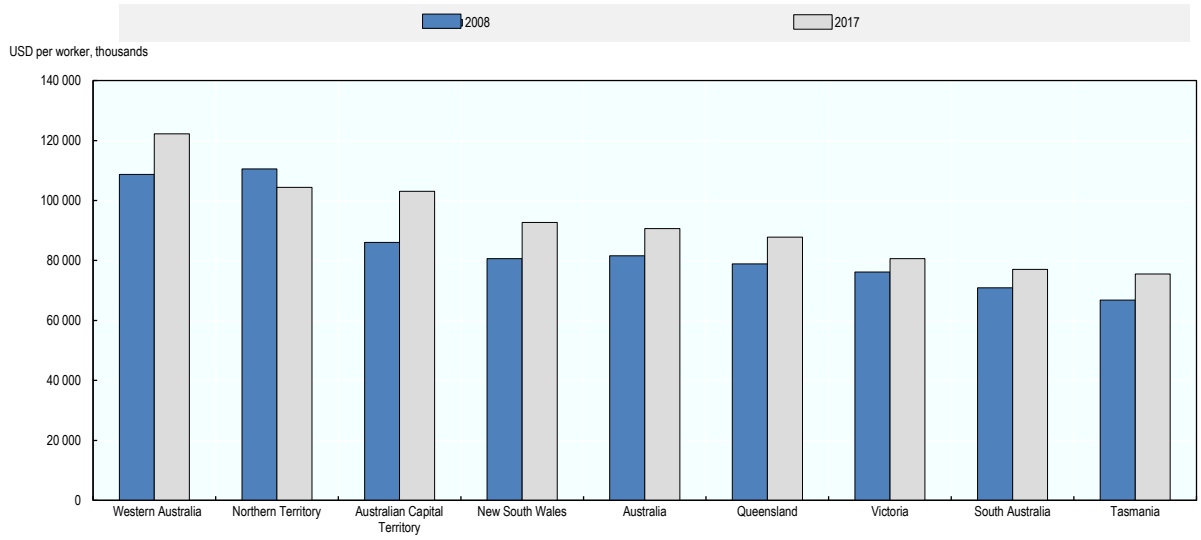
Productivity has grown over the past decades in Australia, but it has slowed down in recent years. Technology has been a driver of productivity growth for many economies, including Australia, underpinning growth in wages, GDP per capita and well-being, with improvements in health, infrastructure and educational attainment (OECD, 2018[15]). In the 2000s, most developed countries, including Australia, have experienced a slowdown in productivity. Potential drivers of slowdowns include falling rates of innovation, the fading impacts of ICT and past economic reforms, and sectoral shifts to lower productivity sectors (Carmody, 2019[24]). While many of the factors that might explain a global productivity slowdown also apply to Australia, the high reliance on commodity exports in Australia is likely to have counteracted these (Australian Government Productivity Commission, 2019[22]). Australia's advantage in Mining in particular has enabled it to complement the fast growing Chinese and Indian economies more so than most developed economies, as the higher growth rates in these economies increased demand for Australian iron ore, coal, natural gas and other commodities (ibid.).

Productivity differentials across states and territories within Australia reflect the sectoral composition of local economies. States and territories that rely heavily on utilities and resource extraction, such as Western Australia and the Northern Territory, have naturally higher productivity levels.

These are capital-intensive sectors and employ a relatively small share of labour which results in naturally higher labour productivity compared to other industries. On the other hand, productivity is lowest in Tasmania. One reason for the lower productivity in Tasmania is that most of the industries which have intrinsically very high levels of labour productivity – because they are capital intensive, or because they rely heavily on very skilled labour where capital-intensive industries – are under-represented in Tasmania's economy (Eslake, 2017[25]).

Figure 2.11. Labour productivity is highest in states and territories relying on utilities and resource extraction

Gross value added per worker, thousands, constant prices, constant PPP, base year 2015



Source: Calculations based on OECD Regional statistics database.

2.2. The risk of automation in Australia

2.2.1. Overall, Australia faces a lower risk of losing jobs to automation than on average across the OECD

Megatrends related to digitalisation, automation and the emergence of the gig economy are impacting labour markets across the OECD. Broad evidence supports concerns that automation could cause job displacement, as the tasks that machines are able to perform are increasing rapidly. However, technological development could also contribute to generating more jobs than it destroys within a given industry. By increasing productivity and reducing prices, certain technologies could have a positive impact on employment in industries other than the ones where they are deployed. Automation can also lower input costs for downstream industries, leading to output and employment growth in those industries (OECD, 2019[26]).

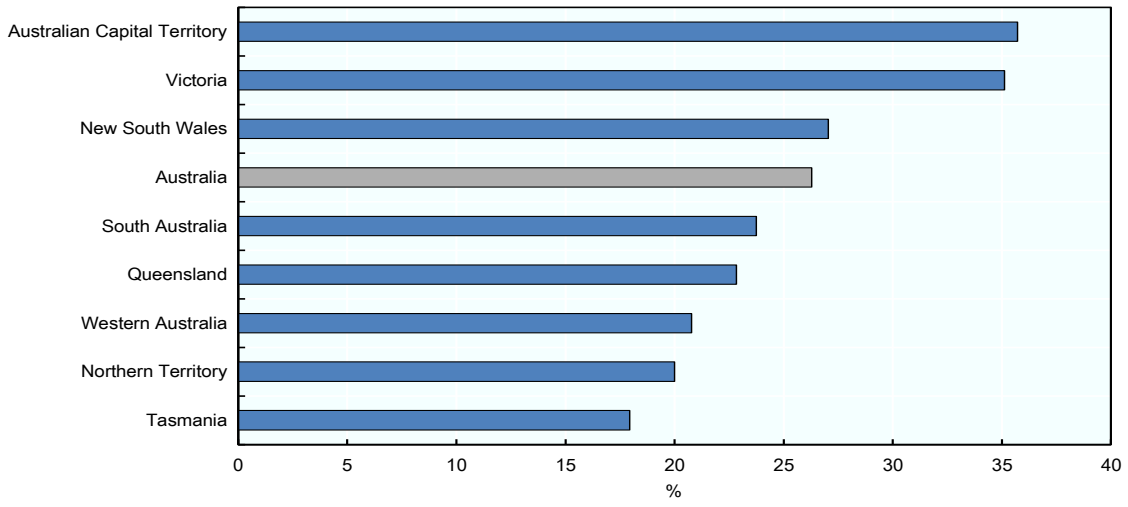
COVID-19 could accelerate the pace of automation in the workplace. Automation has historically taken place in bursts, especially around times of economic shocks, when human labour become relatively more expensive as firms' revenues rapidly decline. In these periods, employers are more likely to shed less-skilled workers and replace them with technology and higher-skilled workers, increasing labour productivity in the face of recessions (Muro, Maxim and Whiton, 2020[27]). More than a quarter of Australian businesses reported an increase in take-up of new technology and automation due to COVID-19, with businesses in

the Australian Capital Territory and Victoria reporting more than a 35% increase (see Figure 2.12). The automation of Australia's industries has been in the works for some time, with Australia being a world leader in adopting mining equipment automation. A potential driver of automation in Australia in light of the pandemic might be a desire to become more self-sufficient in supplying goods and services, with local supply chains that are less susceptible to global shocks. The need to reduce the frequency and duration of human-to-human contact, especially as experts warn of the increasing threat of future pandemics, might be another driver of automation (Roberts, 2020[28]).

Digitalisation and automation have had an overall positive effect on the Australian economy, bringing rises in living standards, but some jobs are at risk. Automation offers the opportunity to increase productivity and competitiveness, helping Australia resume the faster and more widespread income growth of the long boom's early decades (McKinsey & Company, 2019[29]). However, new technologies traditionally also have a potential for disruption, due to their labour saving effect and their uneven impacts across sectors and segments of the population. This is also the case for automation. New technologies are contributing to changing the supply and demand for products, services, labour and skills, producing a reallocation of economic activity across the globe. Some industries, such as Manufacturing, have therefore been a source of jobs and incomes decline, while others, such as business services, have risen. New technologies and structural change also require new skills and tasks, creating demand for some jobs rather than others (OECD, 2018[15]). Employment growth over the past decades in Australia has been concentrated in highly skilled jobs, which are typically less likely to be automated and could instead benefit from technological change (Heath, 2020[30]). High-skill workers tend to specialise in non-routine tasks that are less likely to be performed by a machine. OECD work finds that the correlation between skill content and routine intensity is indeed negative, i.e. that more routine-intensive occupations tend to require lower level skills, although this correlation is not necessarily very strong. High-skill workers may be more difficult to substitute and can be more easily re-employed in non-routine tasks (Marcolin, Miroudot and Squicciarini, 2016[31]). However, new algorithms in combination with the increasing processing power of computers have made it possible for machines to take care of tasks that until now only humans could do (for example, self-checkouts in stores, packing and moving of goods in warehouses, web-scraping data, automated voice receptionists, etc.). This has raised the spectre that specific functions, which have been impossible to automate until now, could be performed by machines instead of people in the future. This also affects high-skilled jobs that were in the past largely shielded from automation (OECD, 2018[32]).

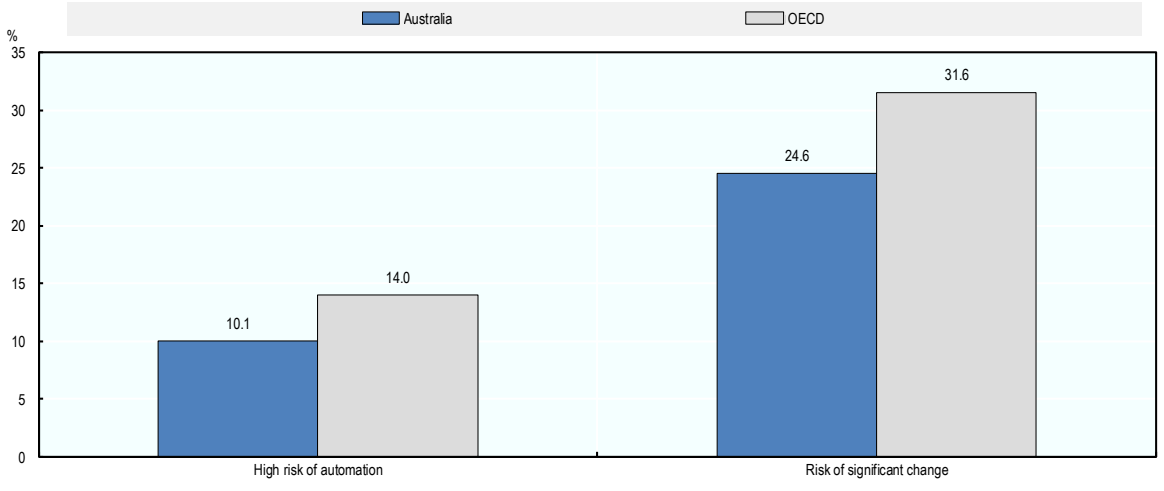
Australia faces a lower risk of losing jobs to automation than on average across the OECD. This points to an occupational and sectoral structure within Australia's economy where jobs entailing tasks at risk of automation are less prevalent than in other OECD countries (see Figure 2.13). OECD work finds that about 36% of jobs are at risk in Australia, compared to the OECD average of about 46% (OECD, 2019[26]). The OECD methodology estimates the risk of automation for individual jobs based on the Survey of Adult Skills (PIAAC) and building on the framework developed by Frey and Osborne (2013[33]) (see Box 2.2).

Figure 2.12. More than a quarter of Australian businesses reported an increase in take-up of new technology and automation due to COVID-19 in 2020



Note: The sample consists of 666 businesses of which 24% were from New South Wales, 20% were from Victoria, 19% were from Queensland, 12% were from South Australia, 12% were from Western Australia, 6% were from Tasmania, 4% were from the Australian Capital Territory, and 4% were from the Northern Territory.
Source: OECD survey of Australian firms, 2020.

Figure 2.13. Risk of automation in Australia is lower than the OECD average



Note: High risk of automation corresponds to a likelihood of automation of 70% or more. Jobs at risk of significant change are those with likelihood of automation between 50 and 70%. Data refer to 2012.
Source: OECD (2019[26]).

Box 2.2. Estimating the risk of automation across OECD countries

Frey and Osborne (FO) estimated the number of occupations at high risk of automation in the United States using a two-step methodology. They conducted a workshop with a group of experts in machine learning, whom they provided with a list of 70 occupations and their corresponding O*NET task descriptions. Experts were asked "Can the tasks of this job be sufficiently specified, conditional on the availability of big data, to be performed by state of the art computer-controlled equipment?". This allowed for the coding of each occupation as automatable or non-automatable. They then used a machine learning algorithm to find out more about the links between the coding to automate and the list of O*NET variables.

FO were able to identify those variables and their associated bottlenecks with higher prediction power. High scores on these bottlenecks are likely to mean that an occupation is safe from automation. They could then compute a 'probability of computerisation' for each occupation in the US, leading to the aggregate estimate that 47% of US jobs have a probability of automation of more than 70%.

The FO model also had its critics. It has been argued that this approach overestimated the likely impact of technological change, while the focus should be on the automatability of the discrete tasks that make up an occupation (Arntz, Gregory and Zierahn, 2016[34]).

Table 2.1. Bottlenecks to automation

Computerisation bottleneck	O*NET variable
Perception and Manipulation	Finger dexterity Manual dexterity Cramped workspace; awkward positions
Creative intelligence	Originality Fine arts
Social intelligence	Social perceptiveness Negotiation Persuasion Assisting and caring for others

Note: Please refer to Frey and Osborne (2013[33]) for further details on the definition of automation bottlenecks.
Source: Frey and Osborne (2013[33]).

Building on and improving the FO model, Nedelkoska and Quintini (2018[35]) **(NQ) calculated the risk of automation across 32 OECD countries**. The methodology is based on individual-level data from the OECD Survey of Adult Skills (PIAAC), providing information on the skills composition of each person's job and their skillset. While drawing on FO, this methodology presents four key differences: (i) training data in the NQ model is taken from Canada to exploit the country's large sample in PIAAC; (ii) O*NET occupational data for FO's 70 original occupations were manually recoded into the International Standard Classification of Occupations (ISCO); (iii) NQ uses a logistic regression compared to FO's Gaussian process classifier; (iv) NQ found equivalents in PIAAC to match FO's bottlenecks (see Table 2.2). While PIAAC includes variables addressing the bottlenecks identified by FO, no perfect match exists for each variable. No question in PIAAC could be identified to account for job elements related to "assisting and caring for others", related to occupations in health and social services. This implies that risks of automation based on NQ could be slightly overestimated.

Table 2.2. Automation bottleneck correspondence

FO computerisation bottleneck	PIAAC variable
Perception and manipulation	Finger dexterity
Creative intelligence	Problem solving (simple) Problem solving (complex)
Social intelligence	Teaching Advising Planning for others Communication Negotiation Influence Sales

Note: Please refer to Nedelkoska and Quintini (2018[35]) for further details on the definition of the PIAAC variables.
Source: OECD (2018[32]); Nedelkoska and Quintini (2018[35]).

Recent studies have pointed out the difficulty in predicting the risk of automation, as different models and variables comes into play. Frey and Osborne's original examination of the impact of automation on jobs was focused on machine learning and mobile robotics, but these are not the only key technological developments likely to impact the future of skills. Others have identified the rise of various forms of telepresence and virtual/augmented/mixed forms of reality, as well as the expansion of digital platforms as trends that will have important impacts on the future. The inherent unpredictability of technological progress means that within the growing literature, estimates of the jobs at risk of automation can vary widely, and the timeframes within which these impacts are predicted to occur are similarly broad, ranging from 10 to 50 years. Both the shape disruption will take, and its extent, are uncertain. What is certain is that workers will need to learn new skills and develop new competencies to adapt to changes are on their way (Crawford Urban and Johal, 2020[36]).

2.2.2. Automation could affect many workers in some occupations in Australia

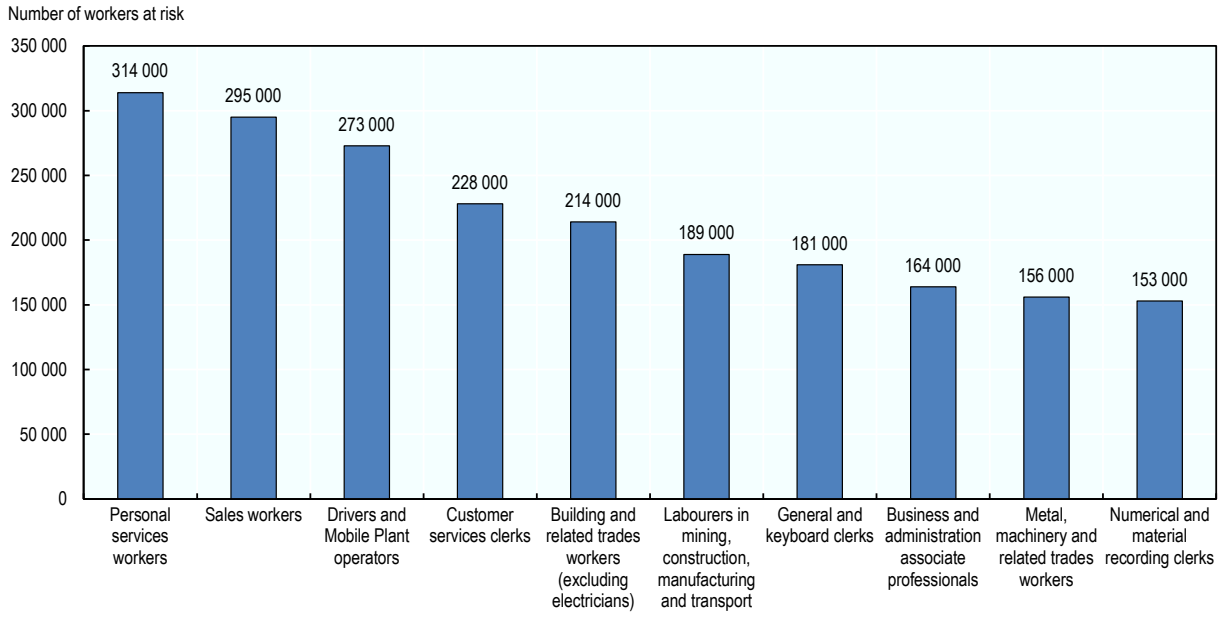
Food Preparation Assistants, Handicraft and Printing Workers and Stationary Plant and Machine Operators are the three occupations facing the highest average risk of automation in Australia (see Figure 2.15). Workers employed in those occupations are therefore at a higher risk of losing their job or experiencing substantial change in terms of the skills required to perform that job. On the other hand, some occupations traditionally face a lower risk of being impacted by automation, including for example Teaching Professionals and Chief Executives, Senior Officials and Legislators. Jobs facing a higher risk of automation entail a relatively higher share of routine, repetitive and manual tasks that are more susceptible to being replicable by machines.

Based on the OECD methodology and given Australia's occupational structure, personal service workers is the occupation that employs the largest number of workers at risk, with almost 315 000 workers who might be impacted by automation. Sales workers, drivers and mobile plant operators and customer services clerks are also occupations that risk facing substantial disruption in the coming years. Figure 2.14 provides an overview of the occupations where labour markets in Australia might face the most disruption. Jobs in these occupations are more likely to be automated on a large scale than in any other occupation. For this reason, automation may prove more disruptive for individual workers - especially if automation occurs quickly and on a large scale - as affected workers will face significant competition from other laid-off workers. Indeed, they will have to compete with a large number of other workers with similar profiles and skill sets who are also looking for new jobs. It should however be noted that there are contextual factors in Australia which might limit the impact of automation on these jobs. There might be

country-specific factors which might limit the risk of automation for some occupations. In the case of Australia for example, geographical distance, market fragmentation and low population density are factors that might limit competitive pressures, potentially reducing incentives for businesses to cut costs and automate, and therefore reducing the risk for certain occupations.

Figure 2.14. Which occupations in Australia might be most impacted by automation?

Top 10 occupations with the largest number of workers at risk



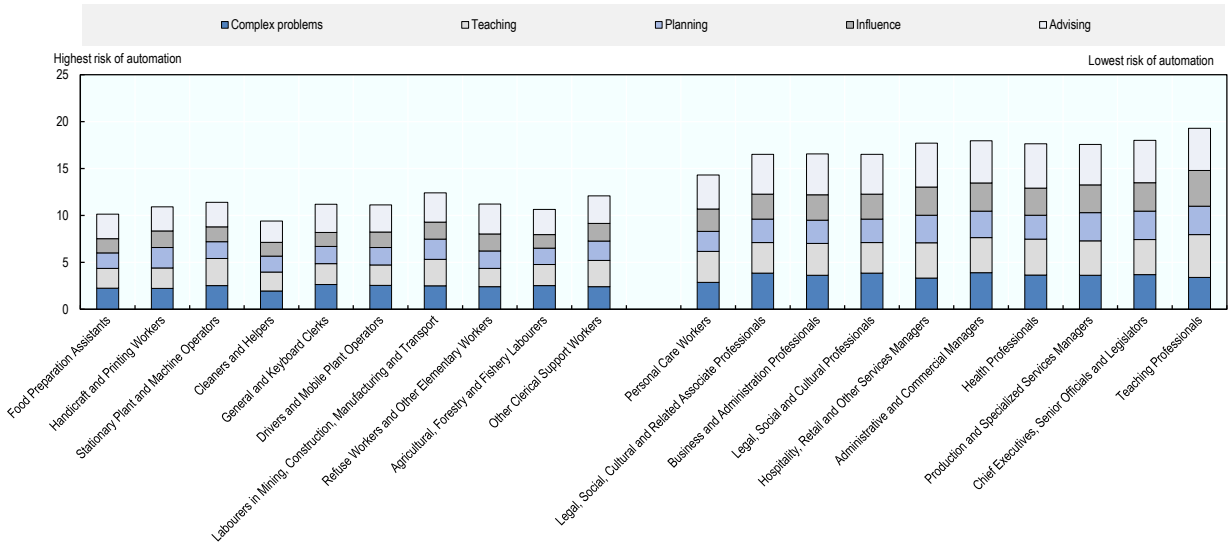
Note: Figure includes persons in high or significant risk. Numbers are based on SA4 level calculations by occupation aggregated to obtain a national estimate.
Source: OECD calculations on Census 2016 data.

The risk of automation for each occupation depends on the tasks that are performed as part of it. Based on the OECD methodology, "bottlenecks to automation" are those tasks that, given the current state of knowledge, are difficult to automate. Bottlenecks include finger dexterity, simple and complex problem solving, teaching, advising, planning for others, communication, negotiation, influence and sales. Occupations where these tasks are frequent face a low risk of automation, while occupations where these tasks are less frequent, face a high risk. For more information about the bottlenecks to automation and their relation with the risk of automation (see Box 2.2).

Figure 2.15 presents the ten occupations facing the highest and lowest risk of automation in Australia, and the frequency of a selected number of bottlenecks to automation. Food Preparation Assistants, the occupation facing the highest risk of automation in Australia, show the lowest frequency of bottlenecks tasks such as planning and influence in Australia. The frequency of complex problems and advising is lowest for Cleaners and Helpers, while that of teaching is lowest for Refuse Workers and Other Elementary Workers. On the other hand, among occupations facing the lowest average risk of automation in Australia, teaching and influence are most frequent for Teaching Professionals. Complex problems are most common for Administrative and Commercial Managers, planning for Chief Executives, and advising for Health Professionals.

Figure 2.15. Jobs at risk of automation entail a low frequency of tasks safe from automation

Frequency of selected bottlenecks to automation, occupations facing the highest and lowest average risk of automation in Australia



Source: OECD calculations on PIAAC.

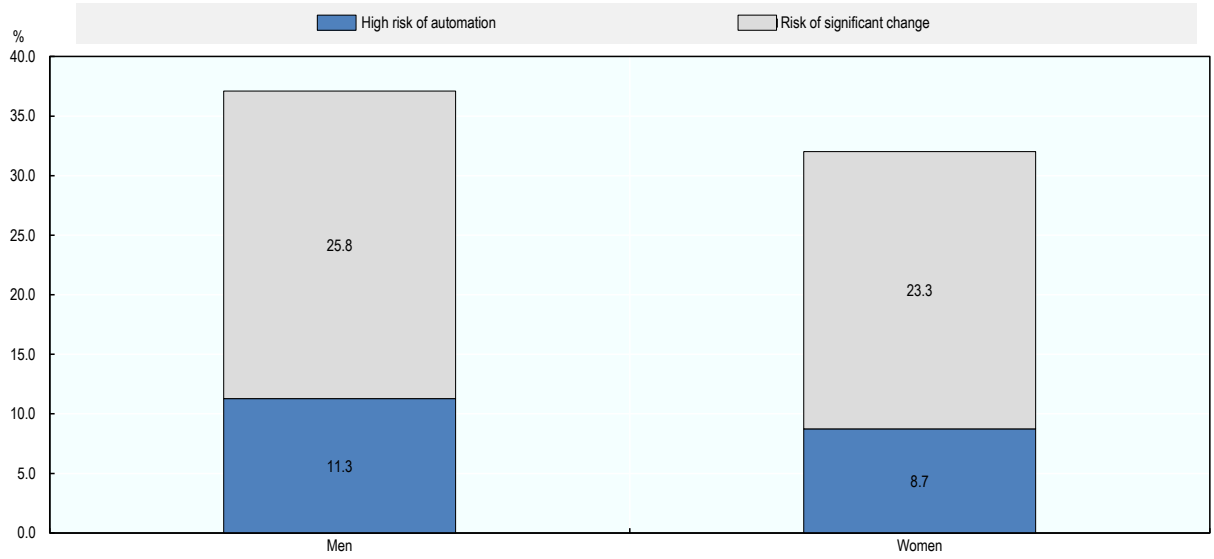
2.2.3. Some segments of the population face a higher risk than others

While both men and women in Australia are employed in occupations that might be impacted by automation, Australian men face a higher risk of automation than women (37.1% and 32.0% respectively), as they are more likely to be employed in occupations involving routine and repetitive tasks (see Figure 2.16). For example, as many as 256 000 men working as drivers and mobile plant operators in Australia are at risk of being affected by automation, compared to 17 000 women. Similarly, almost 200 000 men working as building and related trades workers (excluding electricians), more than 150 000 working as metal, Mmachinery and related trades workers, and more than 150 000 labourers in mining, construction, manufacturing and transport are at risk, compared to 15 000, 2 000 and 36 000 women. On the other hand, however, slightly more women than men face a risk of automation in occupations such as personal pervice workers (221 000 and 93 000 workers respectively) and sales workers (185 000 and 111 000).

Indigenous Australians often work in jobs requiring lower levels of skills, which face the highest risk of being automated over the long-term. They have lower employment shares than the total population in occupations such as managers and professionals. On the other hand, they have higher employment shares in machinery operators and drivers and labourers as well as other low-skill occupations (see Figure 2.17). In addition, efforts to improve labour market conditions of Indigenous Australians could be instrumental in tackling their risk of being impacted by automation. Between 2006 and 2016, Indigenous labour force participation, including the proportion of the 15-64 year-old population employed or seeking employment, had slightly increased from 56.8% to 57.1%, but remained lower than for the rest of the population (75.5% and 77.0% in 2006 and 2016 respectively) and experienced fewer percentage point gains. In addition, Indigenous Australians continue to face higher unemployment rates than the rest of the population, and their conditions seem to have deteriorated between 2006 and 2016. In 2006, the unemployment rate for Indigenous people stood at 15.7% (compared to 5.1% for the rest of the population), while in 2016 it amounted to 18.4% (compared to 6.8% for the rest of the population) (OECD, 2019[37]). The social economy could play a key role in improving labour market outcomes of Indigenous Australians.

Figure 2.16. Australian men face a higher risk of automation than women

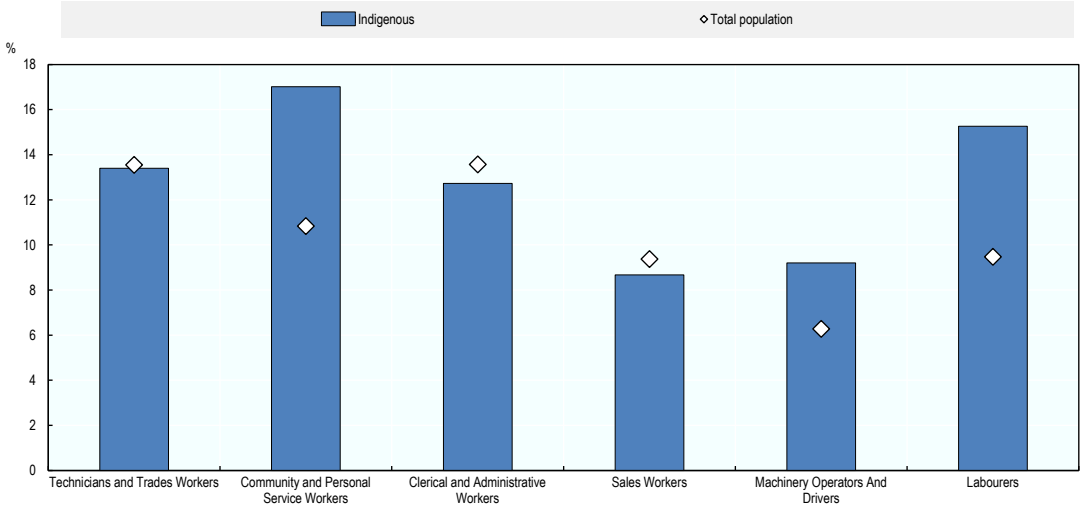
Share of jobs at risk of automation by gender, 2016



Source: OECD calculations on Census 2016 data.

Figure 2.17. Indigenous Australians tend to work in lower-skill occupations, which have a higher probability of being automated

Employment share by occupation, Indigenous and total population in Australia



Note: Non-Indigenous Identity also includes persons who did not specify an identity within the 2016 Census (the category "Indigenous Status Not Stated").
Source: Australian Bureau of Statistics, Census of Population and Housing, 2016.

2.3. What are the local impacts of automation in Australia?

2.3.1. The risk of automation has a regional dimension in Australia

The risk of automation depends on the occupational profile of local labour markets and is therefore asymmetric across places. The geographic dimension of automation has important implications for policy makers trying to design policies that ensure the availability of good quality jobs. Automatable tasks are more prevalent in certain occupations and sectors, and neither occupations nor sectors are evenly distributed within national borders. Thus, areas with a higher proportion of jobs relying on routine tasks are likely to experience more disruption, whereas places where more jobs require tacit skills will face lower levels of risk. Tacit skills are based on experience and intuition instead of formal rules. They are therefore more difficult to replicate through mechanical processes or standard algorithms (OECD, 2018[32]).

The Australian Capital Territory faces the lowest risk of automation across states and territories in Australia. The Australian Capital Territory has a relatively high share of high-skill professionals compared to other states and territories, and it is predominantly a service-based economy. A total 29.3% of jobs are at risk of automation in the Australian Capital Territory – 21.3% facing high risk and 8.0% vulnerable to significant change. Across states and territories, the share of jobs at risk of automation is relatively low also in New South Wales (33.9%), Victoria (34.0%) and the Northern Territory (34.5%).

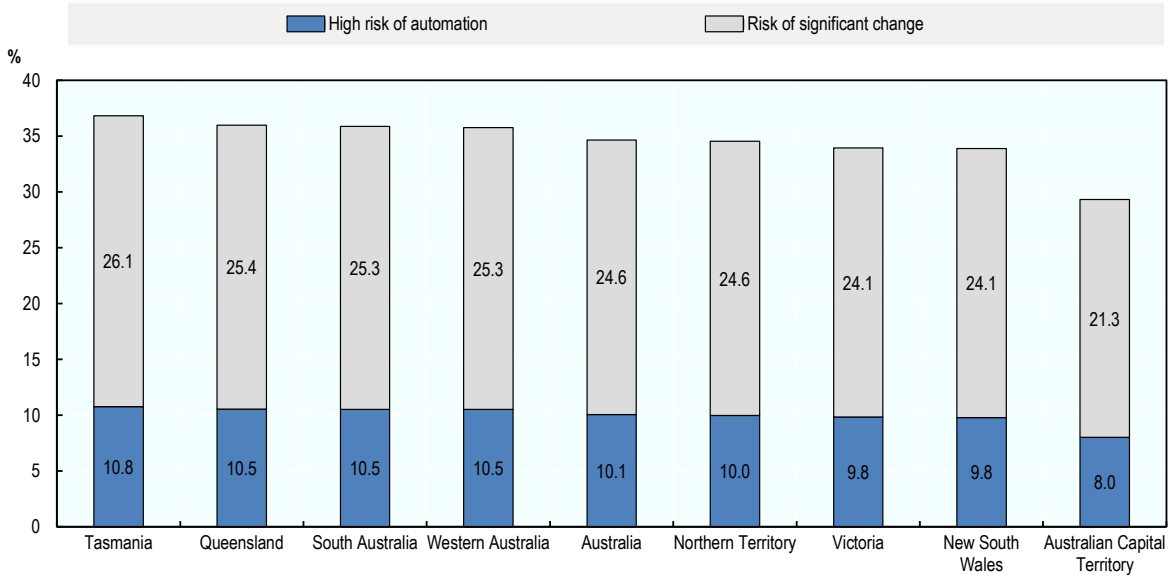
However, regional differences in the risk of automation exist within all Australian states and territories, with some showing higher regional variation than others. For example, regional variation in the share of jobs at risk of automation amounts to more than 15 percentage points in New South Wales, ranging from 40.2% in Hunter Valley exc. Newcastle to 24.6% in Sydney - North Sydney and Hornsby. On the other hand, regional differences in the risk of automation amount to about 1% in Northern Territory (34.9% in Darwin and 33.6% in the Northern Territory – Outback) (see Figure 2.19). Across regions, the risk of automation is highest in Mackay - Isaac - Whitsunday in Queensland (41.2%), followed by South Australia – South East in South Australia (40.3%). On the other hand, Sydney – North Sydney and Hornsby and Sydney – Eastern Suburbs have the lowest risk of losing jobs to automation in Australia, standing at 24.6% and 25.5% respectively. Looking at the total number of jobs at risk, this is highest in Melbourne-South East (Victoria) and Melbourne-West (Victoria), where about 125 000 and 120 000 jobs are at risk of automation respectively.

Regions with the lowest risk of losing jobs to automation in each state are often those surrounding the state's capital. This is not surprising, as capital cities generally have higher employment shares in occupations requiring a higher-skill level, which face a lower risk of being impacted by automation. Capital cities also have a larger population base and higher incomes, which may mean that they are more likely to have less automatable professions such as teaching, health care and hospitality.

Looking at Queensland and Victoria, Brisbane Inner City and Melbourne Inner show the lowest risk among the states' regions. Similarly, Adelaide Central and Hills shows the lowest risk in South Australia, Perth Inner in Western Australia, Sydney – North Sydney and Hornsby in New South Wales, and Hobart in Tasmania.

Figure 2.18. The share of jobs at risk of automation is lowest in the Australian Capital Territory

Share of jobs at risk of automation, Australian states and territories, 2016



Source: OECD calculations on Census 2016 data.

Table 2.3. Which Australian regions have the largest share of jobs at risk of automation?

State	SA4 region	Share of jobs at risk of automation	Number of jobs at risk of automation
Queensland	Mackay - Isaac - Whitsunday	41.2	32 000
South Australia	South Australia - South East	40.3	31 000
Queensland	Logan - Beaudesert	40.2	54 000
Queensland	Darling Downs - Maranoa	40.2	22 000

Source: OECD calculations on Census 2016 data.

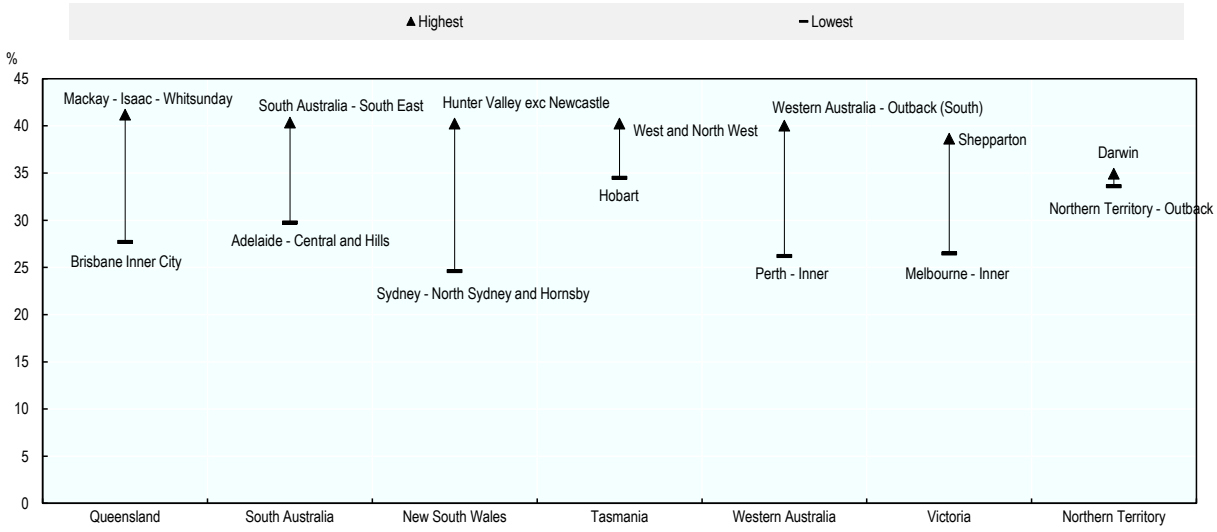
Table 2.4. Which Australian regions have the lowest share of jobs at risk of automation?

State	SA4 region	Share of jobs at risk of automation	Number of jobs at risk of automation
New South Wales	Sydney - North Sydney and Hornsby	24.6	50 000
New South Wales	Sydney - Eastern Suburbs	25.5	34 000
Western Australia	Perth - Inner	26.2	22 000
Victoria	Melbourne - Inner	26.4	83 000

Source: OECD calculations on Census 2016 data.

Figure 2.19. The share of jobs at risk of automation varies substantially within most states and territories

Share of jobs at risk of automation, regions facing the highest and lowest shares within each state



Note: Data from ABS/Census 2016. Only states and territories with two or more SA4 regions are included.

Box 2.3. How is the regional risk of automation calculated?

In order to produce sub-national estimates of the risk of automation, the results of Nedelkoska and Quintini (2018[35]) **are applied at the state/territory and Statistical Area 4 (SA4) level in Australia**. For each state/territory and SA4 region, the share of jobs at risk of automation is calculated using data on provincial and regional employment by occupation and the estimated probabilities of automation from Nedelkoska and Quintini (2018[35]). As an approximation, the method assumes that jobs within the same job category have the same risk of automation across all states/territories and SA4 regions of Australia. Detailed estimates of the risk of automation, including the share and number of jobs at high and significant risk for all Australian SA4 regions, are presented in the .

Importantly, the methodology to estimate the risk of automation in an occupation can account for differences in the risk across countries but it cannot show how the risk of automation within an occupation changes over time. This introduces an important caveat. Countries or regions might respond to the threat of automation not only by shifting into economic sectors that have a lower risk of automation, but also by adapting the task profile of occupations so that they become less susceptible to automation. With the current methodology, it is impossible to capture the latter effect. Estimates that show how the number of jobs at risk of automation changes over time are based on how the number of jobs in different occupations changes over time. In other words, they show how regions gain or lose jobs in risky and less risky occupations.

T**he mean, high and significant risk of automation by occupation in Australia and the number of workers affected are presented in the Annex**. These probabilities are defined for each occupation based on the Nedelkoska and Quintini (2018[35]) methodology using PIAAC. Occupations with the highest mean risk of automation typically do not require specific skills or training, and include food preparation assistants, assemblers, labourers, refuse workers, cleaners and helpers. At the other end of the spectrum are occupations that require high level of education and training and which involve high

degree of social interaction, creativity, problem-solving and caring for others. The high and significant risk of automation probabilities for each occupation in Australia are used to calculate the number of people at risk in each economic region in the country.

Source: Nedelkoska and Quintini (2018[35]).

Source: OECD calculations on Census 2016 data.

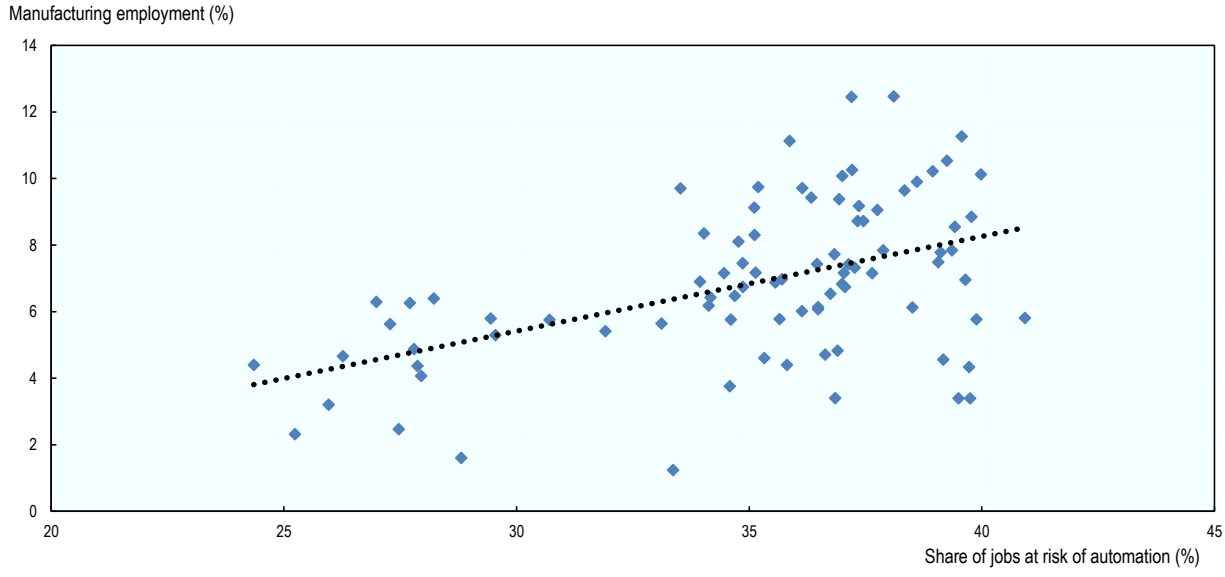
2.3.2. The drivers of the risk of automation vary from one region to the other

The drivers of job loss due to automation differ across regions, even when they face similar risks of automation, and depend on the specific characteristics of the local economy. Therefore, there is not one single explanation of the risk of automation at the local level, and policies to reduce the risk of automation will depend on the specific features of local economies, including their sectoral composition and the workforce skills. In some regions, where Agriculture is a prevalent source of income, the risk of losing jobs to automation might be mainly related to the prevalence of skilled occupations in agriculture, which could be potentially replaced by machines. This might be the example of Darling Downs – Maranoa and Queensland – Outback in Queensland, among others. On the other hand, the prevalence of Manufacturing, construction or administrative jobs in cities and urban regions, might cause the risk of automation in these regions to be related mainly to those occupations. This might for example be the case of Mornington Peninsula in Victoria.

However, Australian regions facing a high risk tend to have some sectoral characteristics in common, such as relatively high employment shares in Manufacturing (see Figure 2.20). Traditional Manufacturing jobs tend to entail routine and repetitive tasks that might be vulnerable to automation. Research conducted for example by Autor (2015[38]) argues that a large proportion of middle-wage occupations, such as Manufacturing or clerical jobs, are highly reliant on easily automatable routine tasks. The prevalence of Manufacturing employment is also a characteristic of regions facing a higher risk of automation across the OECD (OECD, 2018[32]).

Figure 2.20. The risk of automation tends to be higher in Australian regions with higher employment shares in Manufacturing

Manufacturing employment and share of jobs at risk of automation, Australia SA4 regions



Source: OECD calculations on Census 2016 and Australian Bureau of Statistics.

In some Australian regions the risk of automation is driven by occupations which are common to the Mining sector. This is the case of Mackay-Isaac-Whitsunday (Queensland), which is the region facing the highest share of jobs at risk of automation in Australia (41.2%). Here, the regional risk of automation is driven by large employment shares in occupations such as Stationary Plant and Machine Operators, Drivers and Mobile Plant Operators, and Metal, Machinery and Related Trades Workers. A large number of these workers are employed within the Mining sector. In Mackay-Isaac-Whitsunday, about 15 600 people work in the Mining sector, which accounts for 17.4% of total employment.

In other regions, it is large employment shares in Agriculture that contribute to a high risk of automation. South Australia-South East (South Australia) faces one of the highest risk of automation in Australia (40.3%). In the region, the largest amount of jobs at risk of automation are Market-oriented Skilled Agricultural Workers (almost 3 000 workers at risk). South Australia-South East has a high employment share in Agriculture, which is the largest sector in region, accounting for 14.5% of total employment. Similarly, in Darling Downs (Queensland), which faces among the highest risk of automation across regions (40.2%), most workers at risk of automation are employed as Market-oriented Skilled Agricultural Workers (about 2 500 workers at risk). In the region, Agriculture accounts for 24.0% of total employment.

In several other regions, the high risk of automation derives from a mix of occupations in Personal Services, Retail Trade, Construction and Manufacturing. This is the case for example of Logan-Beaudesert (Queensland), which is the region facing the third highest share of jobs at risk of automation (40.2%). About 6 000 Mobile Plant and Machine Operators are at risk, followed by about 4 400 Labourers in Mining, Construction, Manufacturing and Transport, 4 000 Building and Related Trades Workers (excluding Electricians), 4 000 Sales Workers and 3 500 Personal Service Workers. This reflects large regional employment shares in sectors that face a high risk. In the region, Construction accounts for about 14.0% of total employment, followed by Health Care and Social Assistance (12.8%), Manufacturing (10.1%) and Retail Trade (8.4%). Tourism might also be the driver of the risk of automation in some regions (see Box 2.4).

Box 2.4. How will the future of work impact the tourism sector?

COVID-19 has heavily impacted the Tourism industry, in Australia as around the word. Tourism has continued to be one of the sectors hardest hit by the coronavirus pandemic and the outlook remains highly uncertain. While positive news on vaccines has boosted the hopes of Tourism businesses and travellers alike, challenges remain. Vaccine roll out will take some time, and the sector is potentially facing stop/start cycles for some time. The United Nations World Tourism Organization (UNWTO) foresees a decline in international arrivals close to 70%, with recovery to pre-pandemic levels not expected before 2023 (OECD, 2020[39]).

Prior to the pandemic, automation and new technologies were increasingly seen as new opportunities for both tourists and Tourism sector companies. Real-time translation software is making it more convenient for tourists to travel to areas in which they do not speak the language. Indeed, translation apps are now able to translate signage and are expected to go beyond that capability into translating verbal statements in coming years. Companies in the sector are starting to use big data and predictive analytics to increase knowledge of consumer behaviour and customise travel experiences accordingly. Autonomous vehicles (AVs) are already successfully being piloted on the roads in a number of jurisdictions and it is anticipated that the application of this technology on a broader scale could happen by 2025 or sooner.

While Tourism jobs are still recovering from the impacts of COVID-19, going forward automation is also likely to significantly impact some jobs in the sector, reshaping local labour markets that highly rely on Tourism as a source of employment. Jobs that include routine and repetitive tasks, such as moving objects, information processing, calculations, standardised communications, might be automated through computer programs, mobile applications, kiosks, chatbots, robots, autonomous vehicles, and other automation technologies. Within Australia, in Sunshine Coast (Queensland), where Accommodation and Food Services account for 11.5% of total employment, the largest number of workers at risk of automation are Personal Service Workers and Sales Workers (about 5 600 and 4 800 respectively). Similarly, in Gold Coast (also Queensland), where Accommodation and Food Services stand at 10.6% of total employment, there are about 10 000 Personal Service Workers and 9 000 Sales Workers at risk of being impacted by automation, higher than any other occupation. Going forward it will be important to ensure that the adoption of automation technologies in key local industries is matched with strategies to re-skill workers and diversify the economy. It should however also be noted that, given that the majority of businesses operating in the Tourism sector in Australia are SMEs, they might be less able to adopt and invest in automation technologies.

Automation will also change the type of skills needed for some jobs and create entirely new jobs in the Tourism sector. As an example, a marketing specialist would need to update the information in a chatbot and modify its AI rules as necessary. Chefs might need to get acquainted with restaurant information systems and smart fridges. Hotel receptionists might not need to give keys or issue cards to hotel guests, as access to hotel rooms might be with facial recognition technologies. Automation could also create the need for completely new job positions in Tourism companies that are currently largely neglected – e.g. for robot maintenance and repair, kiosks maintenance and repair, big data analytics, machine learning, automation process planning and control.

Rebuilding tourism is a priority, but the sector must become more sustainable and resilient. Seamless travel was identified as a pillar within the tourism agenda for the G20 at the start of 2020 but COVID-19 led to a massive drop in tourism during the year in Australia and around the world. As a result, the sector experienced job losses. As vaccinations roll out and procedures for safe and seamless travel are put in place, jobs are picking up in many locations. However, the crisis is an opportunity to rethink tourism for the future, as measures put in place today will shape the sustainable tourism of tomorrow.

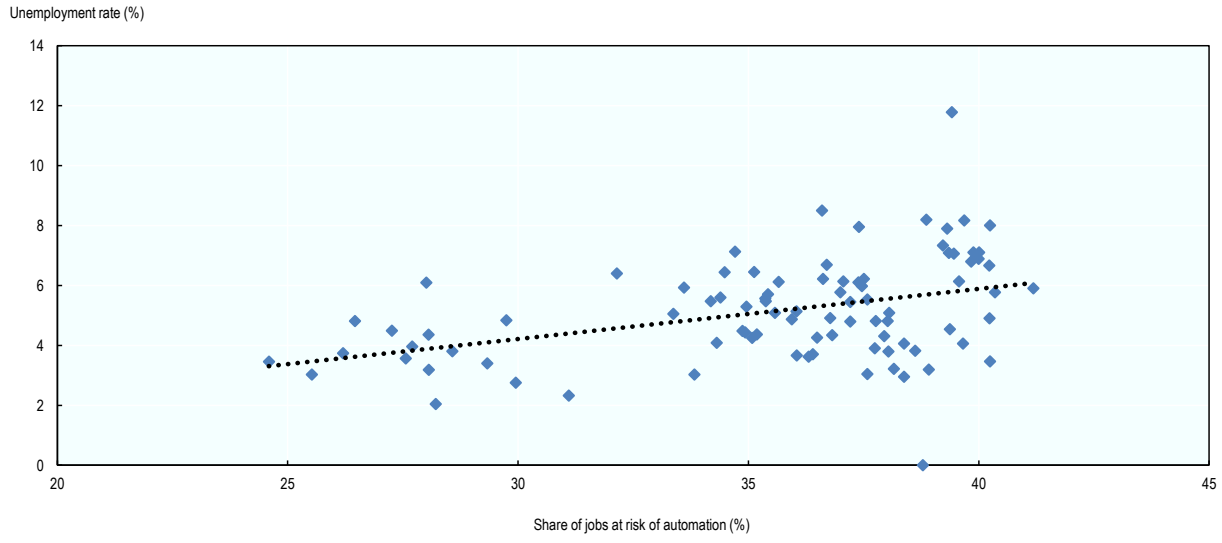
Source: OECD (2018[40]; 2020[41]); Ivanov (2020[42]); (OECD, 2020[43]); (OECD, 2020[44]).

2.3.3. However, regions facing a high risk have some characteristics in common, such as poorer employment and skills outcomes

Regions facing a higher risk of losing jobs to automation in Australia tend to have higher unemployment rates (see Figure 2.21). The unemployment rate was highest in Queensland-Outback (Queensland), standing at 11.8% in 2019. The region has a share of jobs at risk of automation of 39.4%, among the highest across Australia regions. In Mackay - Isaac – Whitsunday, also in Queensland, the region with the highest share of jobs at risk of automation in Australia, the unemployment rate stands at 5.9%, above the average across regions. On the other hand, in Sydney-Inner West (New South Wales), where the unemployment rate is lowest, standing at 2.0%, only 28.2% of jobs are at risk of automation. Sydney - North Sydney and Hornsby (New South Wales), the region with the lowest share of jobs at risk of automation (24.6%), has an unemployment rate of only 3.5%.

Figure 2.21. Regions with a higher share of jobs at risk of automation tend to have higher unemployment rates

Unemployment rates and share of jobs at risk of automation, Australia SA4 regions



Source: OECD calculations on Census 2016 and Australian Bureau of Statistics.

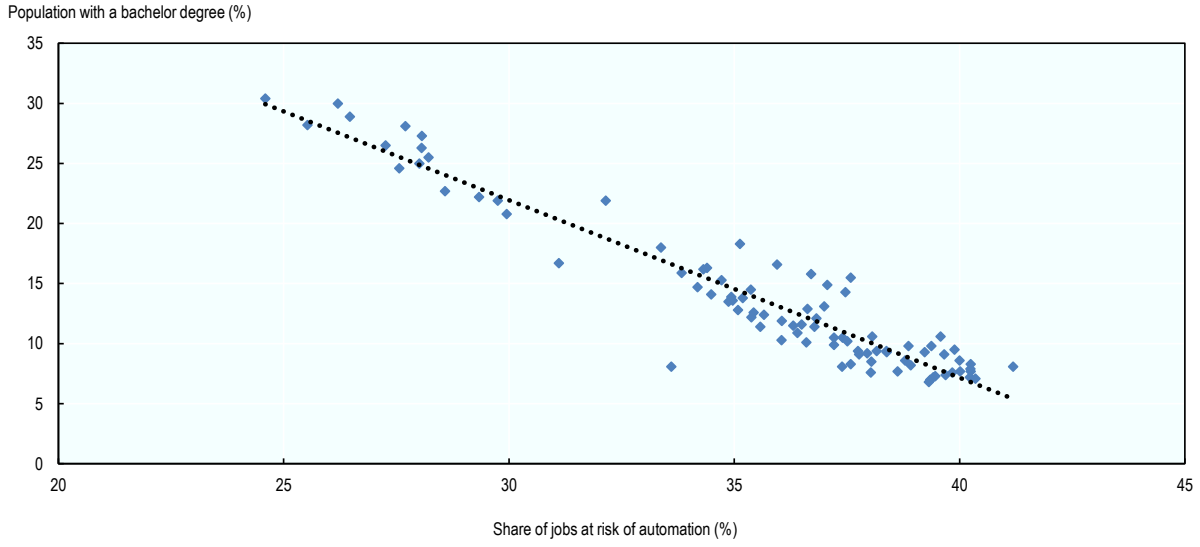
The challenge for regions with high unemployment rates is that they often have lower productivity levels. These regions therefore face a dilemma as on the one hand, they have to provide jobs in the short term. On the other hand, they also have to encourage efforts to increase labour productivity to ensure high employment levels and prosperity in the long term. In many cases, this requires increasing automation, which can harm employment in the short run (OECD, 2018[32]).

The share of jobs at risk of automation also tends to be higher in regions with a lower share of tertiary-educated population (see Figure 2.22). Sydney - North Sydney and Hornsby (New South Wales) is the region with the highest share of tertiary-educated population and the lowest share of jobs at risk of automation, amounting to 30.4% and 24.6% respectively. The share of population with a bachelor's degree is lowest in Wide Bay (Queensland), standing at 6.8%. This region also has among the highest share of jobs at risk in Australia (39.3%). Extensive research documents that places with highly educated workforces are less affected by automation. With some exceptions, the risk of automation decreases as educational attainment required for the job increases. Regions that have the highest share of jobs at risk of automation also have the lowest share of workers with tertiary education. Reducing the risk of

automation in those regions will therefore require efforts in training and education (OECD, 2018[32]). Another key consideration is age demographics. About 39% of the population in Wide Bay is aged over 55. This is compared to 28% nationally. On the other hand, only 25% of the population in north Sydney is aged over 55. It is more common for younger people in Australia to hold a bachelor's degree with a shift in focus towards higher education.

Figure 2.22. The share of jobs at risk of automation is higher in regions with lower levels of skills

Population with a Bachelor Degree and share of jobs at risk of automation, Australia SA4 regions



Source: OECD calculations on Census 2016.

2.3.4. The large majority of Australian regions have created jobs in less risky occupations over the past decade

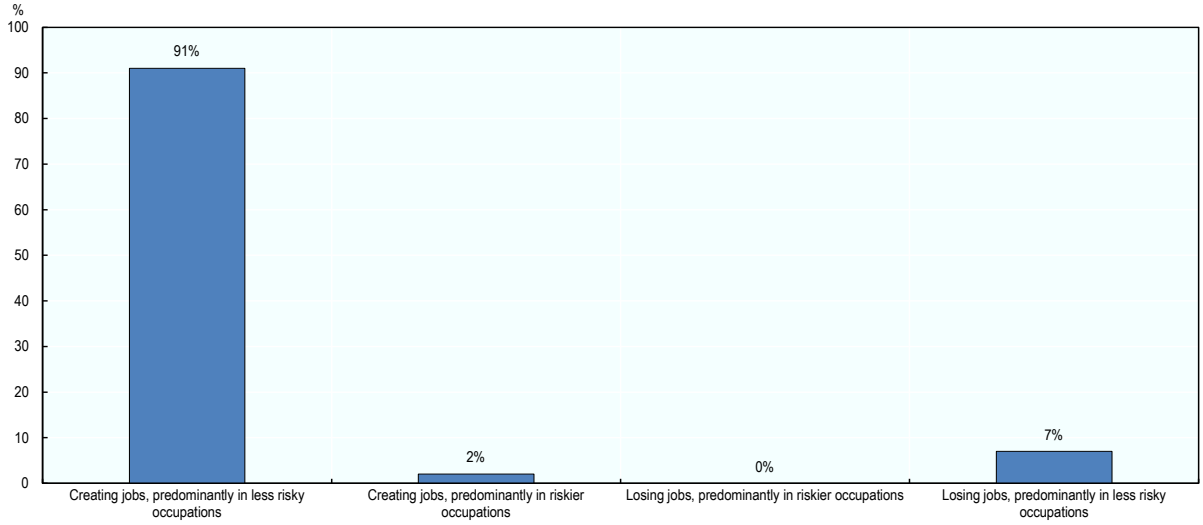
About 81 regions in Australia, accounting for 91% of the total number of regions in the country, have created jobs predominantly in less risky occupations between 2006 and 2016. This suggests that the largest majority of Australian regions have created jobs reducing their vulnerability to automation over the past decade. The occupations that have grown the most in terms of total employment at the national level reducing the risk of automation include health professionals, teaching professionals, production and specialised services managers, business and administration professionals, among others. These factors are part of the structural adjustment taking place: shift in economic activity toward services, knowledge-based occupations etc. Given structural adjustment is likely to continue and highly unlikely to reverse, the point that automation potential may fall overtime, especially in regions where the said industries and occupations are growing, needs to be made.

However, some Australian regions have experienced increases in their exposure to automation, by shifting their employment structure towards jobs at a higher risk. It should be noted however that this risk varies at the local level, being sensible to the specific local context. Six Australian regions (7% of total regions) lost jobs between 2006 and 2016 predominantly in less risky occupations. These include Northern Territory-Outback (Northern Territory), West and North West (Tasmania), South Australia-Outback (South Australia), Queensland-Outback (Queensland), Brisbane-West (Queensland), and Far West and Orana (New South Wales). These regions might face significant challenges, as they are losing jobs and increasing their vulnerability to automation. The loss of jobs at a lower risk of automation in these regions compounds

longer-term trends and challenges faced by these regions. Extreme regional areas in Australia face declining population growth, an aging demographic, skills drain, among others. These factors alone may limit job opportunities to a much greater extent than automation. Two other regions in Australia, including Barossa-Yorke-Mid North (South Australia) and Western Australia-Wheat Belt (Western Australia) are creating jobs, predominantly in risky occupations, therefore increasing their exposure to future labour market disruption.

Figure 2.23. Most Australian regions have created jobs predominantly in less risky occupations since 2006

Percentage of SA4 regions creating/losing jobs, 2006 to 2016



Source: OECD calculations on 2006 and 2016 Censuses.

Box 2.5. A regional typology for employment creation in the face of digitalisation and automation

Regions can be classified into four categories depending on whether they gain or lose jobs and whether the gains or losses occur in sectors with high or low risk of automation. Australian regions are classified according to whether they created jobs in the period 2006 to 2016, and further divided according to the type of occupation in which they created or shed employment. This classification provides insights into the short-term and long-term employment situation of a region (OECD, 2018[32]).

Table 2.5. The typology

Creating jobs		Losing jobs	
Predominantly in less risky occupations	Predominantly in riskier occupations	Predominantly in less risky occupations	Predominantly in riskier occupations
These regions improve their job situation in the short term and also reduce their long-term risk of unemployment from automation	These regions improve their short-term job situation, but do so at the expense of moving towards a riskier job profile in the future	These regions face the greatest challenge. They suffer current job losses combined with an increasing risk of further job losses in the future due to automation	These regions have the typical profile of regions in the process of undergoing a structural change caused by automation. While jobs are being lost to automation today, the risk of further job losses due to automation decreases

Source: OECD (2018[32]).

2.4. Special focus on Sydney-South West (New South Wales) and Warrnambool and South West (Victoria)

The regions of Sydney-South West (New South Wales) and Warrnambool and South West (Victoria) were chosen as case study areas for this report. They were selected because they face a higher risk of automation than on average in Australia and are among those at highest risk within their state. Sydney-South West is characterised by a relatively diversified local economy, with the high risk of automation deriving from high employment shares in a range of occupations at high risk. On the other hand, in Warrnambool and South West, Agriculture is the largest employer and drives the risk of automation in the region.

2.4.1. Sydney-South West: a widespread risk of automation adds to existing labour market challenges, but there are opportunities ahead

Sydney-South West is a populous region within New South Wales that faced more challenging labour market conditions than the rest of the state over the past decade. The region had a population of 405 686 inhabitants according to the 2016 Census, corresponding to about 5.4% of total population in New South Wales. The unemployment rate stood at 6.1% in 2019, among the highest in New South Wales. However, the rate had declined over the past decade and reached lower levels than in 2008. The labour force participation rate stood at 61.8% in 2019, compared to 65.6% across New South Wales. Only 13.8% of the population aged 15 and more has a bachelor's degree level and above in Sydney-South West, compared to 23.4% in New South Wales. Over a fifth of the population (21.4%) has attained Year 12 education as their highest level of education (Australian Bureau of Statistics, 2019[45]). Sydney-South West has a younger population than New South Wales overall, which can contribute to differences in the share of population attaining a bachelor's degree. Sydney-South West has a median age of 35, and about 14.6% of the population is aged 15-24. This compares to a median age of 38 in New South Wales and 12.5% of the population being 15-24 years-old.

Sydney-South West faces among the highest risk of automation across regions in New South Wales (see Figure 2.24). About 39.6% of jobs are at risk of automation in the region, the second highest among all 28 New South Wales regions. Only Hunter Valley exc. Newcastle faces a higher risk (40.2%). The risk of automation in Sydney-South West consists of 12.3% of jobs at high risk of automation and 27.3% at significant risk of change. The region has the highest share of jobs at high risk of automation in New South Wales.

This reflects the occupational profile of Sydney-South West and its differences with New South Wales as a whole. Looking at the sectoral composition of employment, Retail Trade, Health Care and Social Assistance, Manufacturing and Construction are the largest employers in Sydney-South West, accounting for 12.2%, 10.7%, 10.5% and 9.9% of total employment respectively. Sydney-South West has relatively high employment shares in many occupations facing a high risk of automation (see Table 2.6). For example, the region has higher employment shares in occupations such as Food Preparation Assistants, Handicraft and Printing Workers, Stationary Plant and Machine Operators, Cleaners and Helpers (i.e. those performing various tasks including keeping the interiors and fixtures clean or hand-laundering and pressing in private households, hotels, offices, etc.), and General and Keyboard Clerks, which are those facing the highest risk of automation in Australia. Differences in employment shares between Sydney-South West and New South Wales are highest for Drivers and Mobile Plant Operators and Labourers in Mining, Construction, Manufacturing and Transport, amounting to 2.3 and 2.5 percentage points respectively.

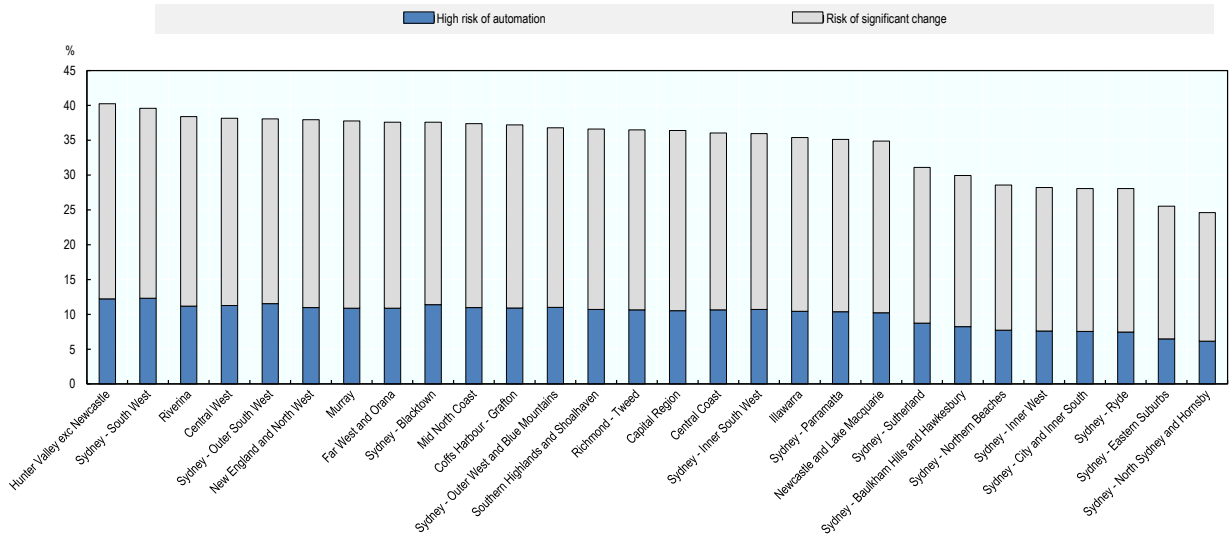
Most workers at risk of automation in Sydney-South West are Drivers and Mobile Plant Operators and Labourers in Mining, Construction, Manufacturing and Transport. About 6 400 people at risk are employed as Drivers and Mobile Plant Operators, followed by 5 300 Labourers in Mining, Construction,

Manufacturing and Transport. Other occupations where the region risks losing many jobs include: Personal Service Workers, Sales Workers, Building and Related Trades Workers (excluding Electricians), where about 4 400, 4 400 and 4 300 jobs risk being affected.

Compared to a decade ago, Sydney-South West has however reduced its risk of automation, having created jobs predominantly in less risky occupations, between 2006 and 2016 (see Figure 2.25). For example, the region has added almost 2 500 Teaching Professionals, 2 000 Health Professionals and 1 600 Production and Specialised Services Managers, which are occupations facing a low risk of automation. At the same time, several occupations facing a higher risk have shed jobs over 2006 to 2016. For example, Stationary Plant and Machine Operators have shed about 500 jobs, Handicraft and Printing Workers about 340, General and Keyboard Clerks about 260. Some occupations at higher risk have however experienced jobs growth between 2006 and 2016 in Sydney-South West. A prominent example is given by Drivers and Mobile Plant Operators, which have added more than 2 200 jobs over that period. Going forward, it will be important for the region to ensure that future jobs growth is not driven by higher-risk occupations.

Figure 2.24. Sydney-South West faces the second highest risk of automation in New South Wales

Share of jobs at risk of automation, SA4 regions in New South Wales, 2016



Source: OECD calculations on Census 2016.

Table 2.6. Sydney-South West has high employment shares in occupations at high risk

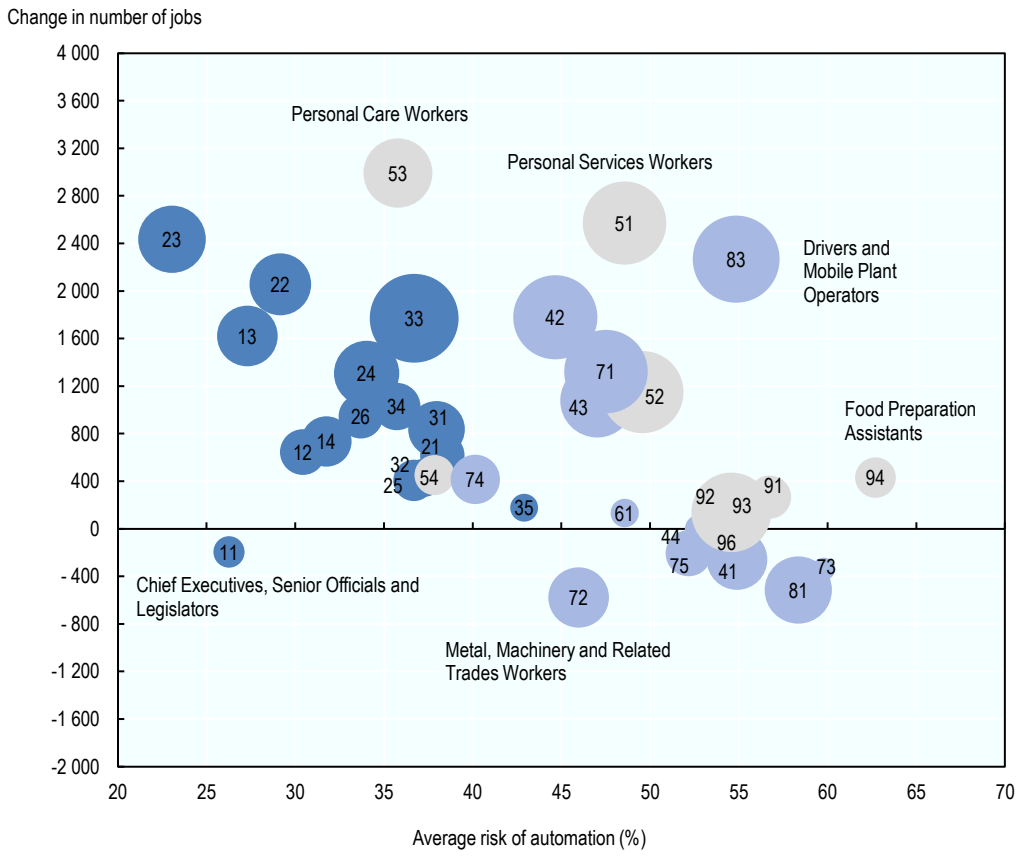
Occupation	Total employment	Occupation share of total employment	Jobs at significant risk of change	Jobs at high risk of automation
Food Preparation Assistants	2 000	1.4%	32.7%	48.7%
Handicraft and Printing Workers	1 000	0.4%	50.4%	32.0%
Stationary Plant and Machine Operators	6 000	3.8%	39.4%	32.1%
Cleaners and Helpers	2 000	1.5%	54.4%	20.5%
General and Keyboard Clerks	5 000	3.1%	39.6%	24.0%
Drivers and Mobile Plant Operators	10 000	6.3%	44.4%	20.8%
Labourers in Mining, Construction, Manufacturing and Transport	8 000	5.3%	32.9%	31.3%

Refuse Workers and Other Elementary Workers	2 000	1.0%	24.6%	28.8%
Agricultural, Forestry and Fishery Labourers	1 000	0.4%	45.1%	10.4%
Other Clerical Support Workers	1 000	0.8%	40.5%	20.2%

Note: total employment numbers are rounded.
Source: OECD calculations on Census 2016.

Figure 2.25. Sydney-South West has created jobs mainly in occupations at lower risk of automation

Change in number of jobs by occupation, 2006 to 2016



Note: Dark blue represents high-skill jobs, light blue represents middle-skill and gray represents low-skill. The number in the bubbles denotes the occupation ISCO-08 code.
Source: OECD calculations on 2006 and 2016 Census.

2.4.2. Warrnambool and South West: Agriculture drives the risk of automation, but employment has shifted towards lower-risk occupations recently

The unemployment rate in Warrnambool and South West has traditionally been lower than elsewhere in Victoria. The rate stood at about 3.0% in 2019, compared to 4.7% on average in Victoria, and the lowest among all Victorian SA4 regions. Already in 2008, the unemployment rate was lowest in Warrnambool and South West compared to other regions in the state. Warrnambool and South West has a total population of about 126 000 people in 2020, accounting for about 2% of Victoria's total population. According to Census data, Aboriginal and Torres Strait Islander people make up 1.5% of the local

population, compared to 0.8% in Victoria. The share of people attaining bachelor's degree level and above is substantially lower in Warrnambool and South West compared to Victoria on average (12.7% and 24.3% respectively). The largest share of the population in Warrnambool and South West has a Certificate level III qualification (15.5%) (Australian Bureau of Statistics, 2019[46]).

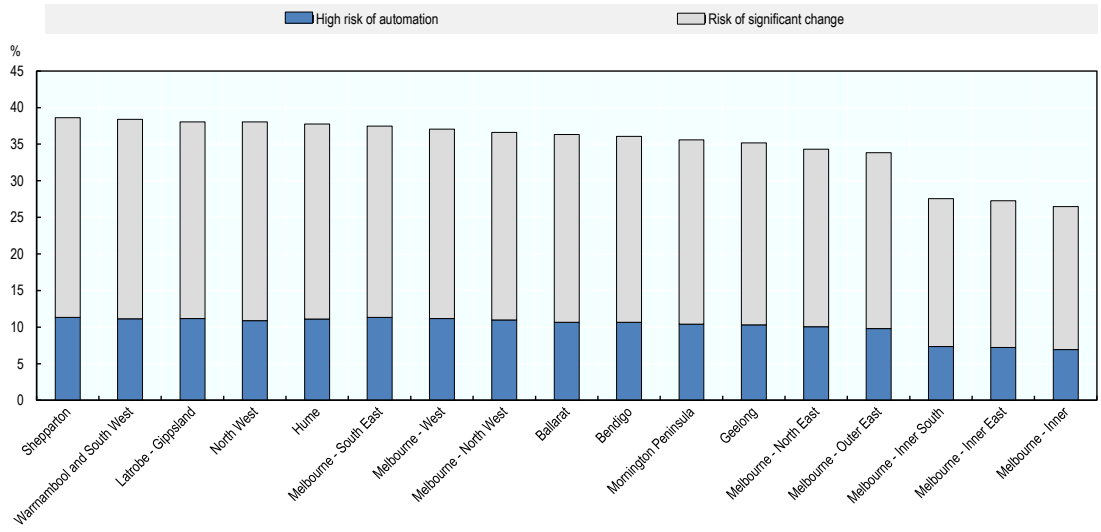
Agriculture is the main driver of local employment in Warrnambool and South West. Agriculture, Forestry and Fishing accounts for 22.5% of total employment (or 15 200 jobs). Employment in Agriculture has also been growing over the past five years, adding about 4 100 jobs between 2015 and 2020. Health Care and Social Assistance is the second largest sector, employing 10.7% of the local workforce (7 200 people), followed by Education and Training and Accommodation and Food Services, accounting for 9.3% of total employment respectively, or 6 300 jobs.

Driven by occupations in Agriculture, the risk of automation is substantially higher in Warrnambool and South West than elsewhere in the state of Victoria (see Figure 2.26). About 38.4% of jobs are at risk, compared to 34.0% on average in the state. The high share of jobs at risk of automation in the region is driven by Agriculture, as about 2 250 workers employed as Market-oriented Skilled Agricultural Workers are at risk of being impacted by automation. This is followed by about 2 000 Drivers and Mobile Plant Operators, 1 800 Personal Service Workers and 1 500 Sales Workers.

Overall, the region has created jobs in less risky occupations between 2006 and 2016 (see Figure 2.27). As an example, the region has generated about 400 Health Professionals over this period, which face a low risk of automation. At the same time, the region has lost jobs in riskier occupations, such as Labourers in Mining, Construction, Manufacturing (-450 jobs) and Transport and Market-oriented Skilled Agricultural Workers (-550 jobs). However, it also created jobs in occupations facing a higher risk, which potentially poses challenges for the longer term might these trends continue or intensify. For example, the region has added about 300 Food Preparation Assistants and 300 Drivers and Mobile Plant Operators.

Figure 2.26. In Warrnambool and South West, the risk of automation is among the highest in Victoria

Share of jobs at risk of automation, SA4 regions in Victoria, 2016



Source: OECD calculations on 2016 Census

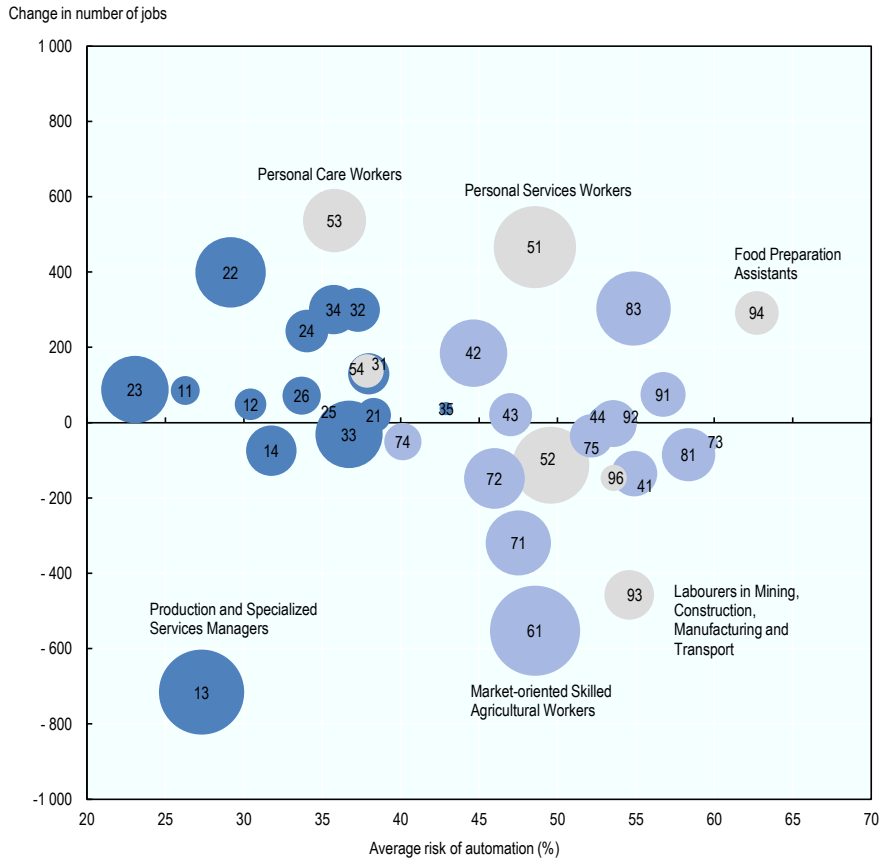
Table 2.7. Warrnambool and South West tends to have higher employer shares in occupations at risk than Victoria

Occupation	Total employment	Occupation share of total employment	Jobs at significant risk of change	Jobs at high risk of automation
Food Preparation Assistants	1 000	1.9%	32.7%	48.7%
Handicraft and Printing Workers	100	0.2%	50.4%	32.0%
Stationary Plant and Machine Operators	2 000	2.8%	39.4%	32.1%
Cleaners and Helpers	1 000	2.0%	54.4%	20.5%
General and Keyboard Clerks	1 000	2.1%	39.6%	24.0%
Drivers and Mobile Plant Operators	3 000	5.5%	44.4%	20.8%
Labourers in Mining, Construction, Manufacturing and Transport	1 000	2.5%	32.9%	31.3%
Refuse Workers and Other Elementary Workers	400	0.7%	24.6%	28.8%
Agricultural, Forestry and Fishery Labourers	1 000	2.2%	45.1%	10.4%
Other Clerical Support Workers	300	0.6%	40.5%	20.2%

Note: total employment numbers are rounded.
Source: OECD calculations on 2016 Census.

Figure 2.27. Warrnambool and South West has created jobs mainly in occupations at lower risk of automation

Change in number of jobs by occupation, 2006 to 2016



Note: Dark blue represents high-skill jobs, light blue represents middle-skill and gray represents low-skill. The number in the bubbles denotes the occupation ISCO-08 code.
Source: OECD calculations on 2006 and 2016 Census.

References

Adeney, R. (2018), *Structural Change in the Australian Economy*, https://www.rba.gov.au/publications/bulletin/2018/mar/pdf/structural-change-in-the-australian-economy.pdf (accessed on 2 June 2020). [16]

Arntz, M., T. Gregory and U. Zierahn (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", *OECD Social, Employment and Migration Working Papers*, No. 189, OECD Publishing, Paris, https://dx.doi.org/10.1787/5jlz9h56dvq7-en. [34]

Australian Bureau of Statistics (2020), *6202.0 - Labour Force, Australia, Apr 2020*, https://www.abs.gov.au/ausstats/abs@.nsf/0/6050C537617B613BCA25836800102753?Opendocument (accessed on 18 May 2020). [3]

Australian Bureau of Statistics (2019), *2016 Census QuickStats: Sydney - South West*, https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/127?opendocument (accessed on 15 June 2020). [45]

Australian Bureau of Statistics (2019), *2016 Census QuickStats: Warrnambool and South West*, https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/217?opendocument (accessed on 15 June 2020). [46]

Australian Government (2020), *3 Step Framework for a COVID Safe Australia*, https://www.pm.gov.au/sites/default/files/files/three-step-framework-covidsafe-australia.pdf (accessed on 18 May 2020). [48]

Australian Government Department of Education, Skills and Employment (2020), *Impact of COVID-19 on Australian businesses - part one*, https://www.employment.gov.au/newsroom/impact-covid-19-australian-businesses-part-one (accessed on 18 May 2020). [4]

Australian Government Department of Education, Skills and Employment (2020), *JobTrainer package announced*, https://www.dese.gov.au/news/jobtrainer-package-announced (accessed on 24 July 2020). [5]

Australian Government Productivity Commission (2020), *PC Productivity Insights: Can Australia become a productivity leader?*, https://www.pc.gov.au/research/ongoing/productivity-insights/australia-leader/productivity-insights-2020-australia-leader.pdf (accessed on 4 June 2020). [23]

Australian Government Productivity Commission (2019), *PC Productivity Bulletin*, https://www.pc.gov.au/research/ongoing/productivity-insights/2019/productivity-bulletin-2019.pdf (accessed on 4 June 2020). [22]

Australian Government Treasury (2020), *Economic Response to the Coronavirus*, https://treasury.gov.au/coronavirus/businesses (accessed on 29 July 2020). [6]

Autor, D. (2015), "Why Are There Still So Many Jobs? The History and Future of Workplace Automation", *Journal of Economic Perspectives*, Vol. 29/3, pp. 3-30, http://dx.doi.org/10.1257/jep.29.3.3. [38]

Borland, J. (2020), *Labour market snapshot #56 April 2020*, https://cdn.theconversation.com/static_files/files/906/lmsapr20new_%281%29.pdf?1585212052 (accessed on 15 June 2020). [8]

Carmody, C. (2019), *Slowing productivity growth-a developed economy comparison*. [24]

Crawford Urban, M. and S. Johal (2020), *Understanding the Future of Skills: Trends and Global Policy Responses*, https://fsc-ccf.ca/wp-content/uploads/2020/01/UnderstandingTheFutureOfSkills-PPF-JAN2020-EN.pdf (accessed on 14 May 2020). [36]

Eslake, S. (2017), *Education, Productivity and Economic Performance: Tasmania, then, now and tomorrow*, http://dx.doi.org/10.13140/RG.2.2.16614.73288. [25]

Frey, C. and M. Osborne (2013), *THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERISATION?*, University of Oxford, https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf (accessed on 10 July 2019). [33]

Garnett, A. (2018), *The Changes and Challenges Facing Regional Labour Markets*, https://businesslaw.curtin.edu.au/wp-content/uploads/sites/5/2019/06/AJLE-v21n2-Garnett.pdf (accessed on 3 June 2020). [19]

Georgeson, C. and A. Harrison (2015), *Regional impacts of the accelerated decline of the manufacturing sector in Australia*, http://www.industry.gov.au/OCE (accessed on 2 June 2020). [21]

Gilfillan, G. (2020), *COVID-19: Labour market impacts on key demographic groups, industries and regions*, https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp2021/COVID-19-Stat_Snapshot#_Toc54358710. [47]

Heath, A. (2020), *Skills, Technology and the Future of Work*, https://www.rba.gov.au/speeches/2020/sp-so-2020-03-16.html (accessed on 15 June 2020). [30]

Ivanov, S. (2020), "The impact of automation on tourism and hospitality jobs", *Information Technology and Tourism*, http://dx.doi.org/10.1007/s40558-020-00175-1. [42]

Kelly, G. and G. La Cava (2014), *International Trade Costs, Global Supply Chains and Value-added Trade in Australia*, https://www.rba.gov.au/publications/rdp/2014/pdf/rdp2014-07.pdf (accessed on 2 June 2020). [18]

Marcolin, L., S. Miroudot and M. Squicciarini (2016), "Routine jobs, employment and technological innovation in global value chains", *OECD Science, Technology and Industry Working Papers*, No. 2016/1, OECD Publishing, Paris, https://dx.doi.org/10.1787/5jm5dcz2d26j-en. [31]

McKinsey & Company (2019), *Australia's automation opportunity: Reigniting productivity and inclusive income growth*, https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Future%20of%20Organizations/Australias%20automation%20opportunity%20Reigniting%20productivity%20and%20inclusive%20income%20growth/Australia-automation-opportunity-vF.ashx (accessed on 8 June 2020). [29]

Muro, M., R. Maxim and J. Whiton (2020), *The robots are ready as the COVID-19 recession spreads*, The Brookings Institution, https://www.brookings.edu/blog/the-avenue/2020/03/24/the-robots-are-ready-as-the-covid-19-recession-spreads/ (accessed on 22 April 2020). [27]

National Skills Commission (2020), *A snapshot in time: The Australian labour market and COVID-19*, https://www.nationalskillscommission.gov.au/sites/default/files/2020-06/NSC_a_snapshot_in_time_report.pdf (accessed on 22 July 2020). [1]

National Skills Commission (2020), *The shape of Australia's post COVID-19 workforce*, https://www.nationalskillscommission.gov.au/sites/default/files/2020-12/NSC%20Shape%20of%20Australias%20post%20COVID-19%20workforce.pdf. [2]

Nedelkoska, L. and G. Quintini (2018), "Automation, skills use and training", *OECD Social, Employment and Migration Working Papers*, No. 202, OECD Publishing, Paris, https://dx.doi.org/10.1787/2e2f4eea-en. [35]

OECD (2021), *Implications of Remote Working Adoption on Place Based Policies: A Focus on G7 Countries*, OECD Publishing, Paris, https://dx.doi.org/10.1787/b12f6b85-en. [10]

OECD (2021), *OECD Regional Outlook 2021: Addressing COVID-19 and Moving to Net Zero Greenhouse Gas Emissions*, OECD Publishing, Paris, https://dx.doi.org/10.1787/17017efe-en. [12]

OECD (2020), *Capacity for remote working can affect lockdown costs differently across places*, https://read.oecd-ilibrary.org/view/?ref=134_134296-u9iq2m67ag&title=Capacity-for-remote-working-can-affect-lockdown-costs-differently-across-places (accessed on 22 July 2020). [11]

OECD (2020), *From pandemic to recovery: Local employment and economic development*, https://read.oecd-ilibrary.org/view/?ref=130_130810-m60ml0s4wf&title=From-pandemic-to-recovery-Local-employment-and-economic-development (accessed on 12 May 2020). [7]

OECD (2020), "Mitigating the impact of COVID-19 on tourism and supporting recovery", *OECD Tourism Papers*, No. 2020/03, OECD Publishing, Paris, https://dx.doi.org/10.1787/47045bae-en. [39]

OECD (2020), *OECD Regions and Cities at a Glance 2020*, OECD Publishing, Paris, https://dx.doi.org/10.1787/959d5ba0-en. [13]

OECD (2020), *OECD Tourism Trends and Policies 2020*, OECD Publishing, Paris, https://dx.doi.org/10.1787/6b47b985-en. [41]

OECD (2020), *Productivity gains from teleworking in the post COVID-19 era*, https://read.oecd-ilibrary.org/view/?ref=135_135250-u15liwp4jd&title=Productivity-gains-from-teleworking-in-the-post-COVID-19-era (accessed on 22 July 2020). [9]

OECD (2020), *Rebuilding tourism for the future: COVID-19 policy responses and recovery*, OECD Publishing, Paris, https://www.oecd.org/coronavirus/policy-responses/rebuilding-tourism-for-the-future-covid-19-policy-responses-and-recovery-bced9859. [43]

OECD (2020), "Safe and seamless travel and improved traveller experience: OECD Report to G20 Tourism Working Group", *OECD Tourism Papers*, No. 2020/02, OECD Publishing, Paris, https://dx.doi.org/10.1787/d717feea-en. [44]

OECD (2019), *Engaging Employers and Developing Skills at the Local Level in Australia*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264304888-en. [14]

OECD (2019), *Indigenous Employment and Skills Strategies in Australia*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, https://dx.doi.org/10.1787/dd1029ea-en. [37]

OECD (2019), *OECD Employment Outlook 2019: The Future of Work*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9ee00155-en. [26]

OECD (2018), *Getting Skills Right: Australia*, Getting Skills Right, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264303539-en. [20]

OECD (2018), *Job Creation and Local Economic Development 2018: Preparing for the Future of Work*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264305342-en. [32]

OECD (2018), *OECD Economic Surveys: Australia 2018*, OECD Publishing, Paris, https://dx.doi.org/10.1787/eco_surveys-aus-2018-en. [15]

OECD (2018), *OECD Tourism Trends and Policies 2018*, OECD Publishing, Paris, https://dx.doi.org/10.1787/tour-2018-en. [40]

Roberts, J. (2020), *Will COVID-19 mark the rise of automation?*, https://australiascience.tv/will-covid-19-mark-the-rise-of-automation/ (accessed on 11 June 2020). [28]

Timmer, M. et al. (2014), “Slicing Up Global Value Chains”, *Journal of Economic Perspectives*, Vol. 28/2, pp. 99-118, http://dx.doi.org/10.1257/jep.28.2.99. [17]

Annex 2.A. Jobs at risk of automation

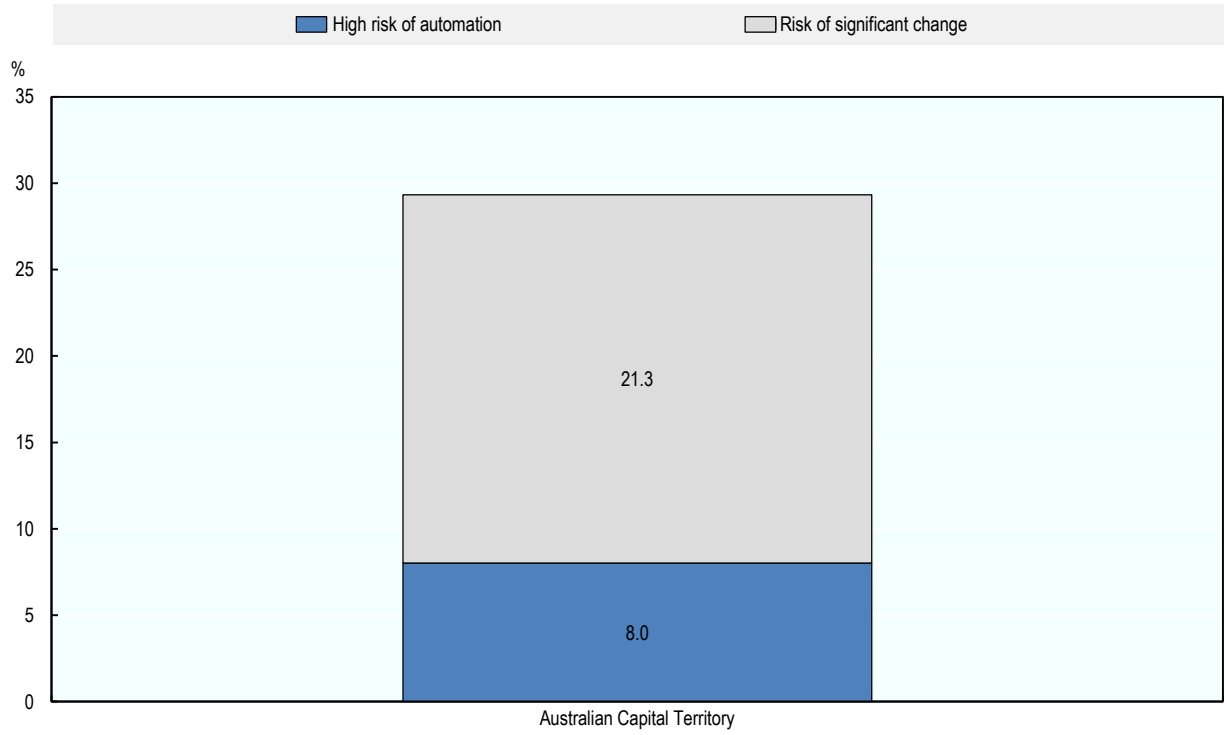
Annexe Table 2.A.1. Share of jobs facing significant risk of change, high risk of automation, and average risk of automation

Occupation code (ISCO-08)	Occupation title	Significant risk of change	High risk of automation	Average risk of automation
11	Chief Executives, Senior Officials and Legislators	1.5%	0.0%	26.3%
12	Administrative and Commercial Managers	5.9%	1.6%	30.4%
13	Production and Specialized Services Managers	4.0%	1.0%	27.3%
14	Hospitality, Retail and Other Services Managers	10.1%	0.2%	31.8%
21	Science and Engineering Professionals	12.8%	7.0%	38.3%
22	Health Professionals	11.6%	1.1%	29.2%
23	Teaching Professionals	1.7%	0.0%	23.1%
24	Business and Administration Professionals	14.6%	1.0%	34.0%
25	Information and Communications Technology Professionals	18.9%	4.8%	36.7%
26	Legal, Social and Cultural Professionals	15.1%	2.5%	33.7%
31	Science and Engineering Associate Professionals	25.7%	7.9%	38.0%
32	Health Associate Professionals	19.1%	3.8%	37.3%
33	Business and Administration Associate Professionals	18.3%	3.9%	36.7%
34	Legal, Social, Cultural and Related Associate Professionals	16.3%	5.3%	35.7%
35	Information and Communications Technicians	20.1%	6.7%	42.9%
41	General and Keyboard Clerks	39.6%	24.0%	54.9%
42	Customer Services Clerks	33.4$	9.6%	44.6%
43	Numerical and Material Recording Clerks	33.9%	13.4%	47.0%
44	Other Clerical Support Workers	40.5%	20.2%	52.8%
51	Personal Service Workers	35.2%	14.3%	48.6%
52	Sales Workers	37.2%	13.3%	49.6%
53	Personal Care Workers	21.2%	5.6%	35.8%
54	Protective Services Workers	19.7%	6.5%	37.8%
61	Market-oriented Skilled Agricultural Workers	40.4%	11.1%	48.6%
71	Building and Related Trades Workers (excluding Electricians)	32.2%	15.9%	47.5%
72	Metal, Machinery and Related Trades Workers	40.2%	11.7%	46.0%
73	Handicraft and Printing Workers	50.4%	32.0%	59.8%
74	Electrical and Electronic Trades Workers	18.8%	7.5%	40.1%

75	Food Processing, Woodworking, Garment and Other Craft and Related Trades Workers	40.0%	14.5%	52.2%
81	Stationary Plant and Machine Operators	39.4%	32.1%	58.4%
83	Drivers and Mobile Plant Operators	44.4%	20.8%	54.9%
91	Cleaners and Helpers	54.4%	20.5%	56.7%
92	Agricultural, Forestry and Fishery Labourers	45.1%	10.4%	53.6%
93	Labourers in Mining, Construction, Manufacturing and Transport	32.9%	31.3%	54.6%
94	Food Preparation Assistants	32.7%	48.7%	62.7%
96	Refuse Workers and Other Elementary Workers	24.6%	28.8%	53.6%

Source: OECD calculations on PIAAC.

Annex Figure 2.A.1. Share of jobs facing risk significant change or high risk of automation in the Australian Capital Territory



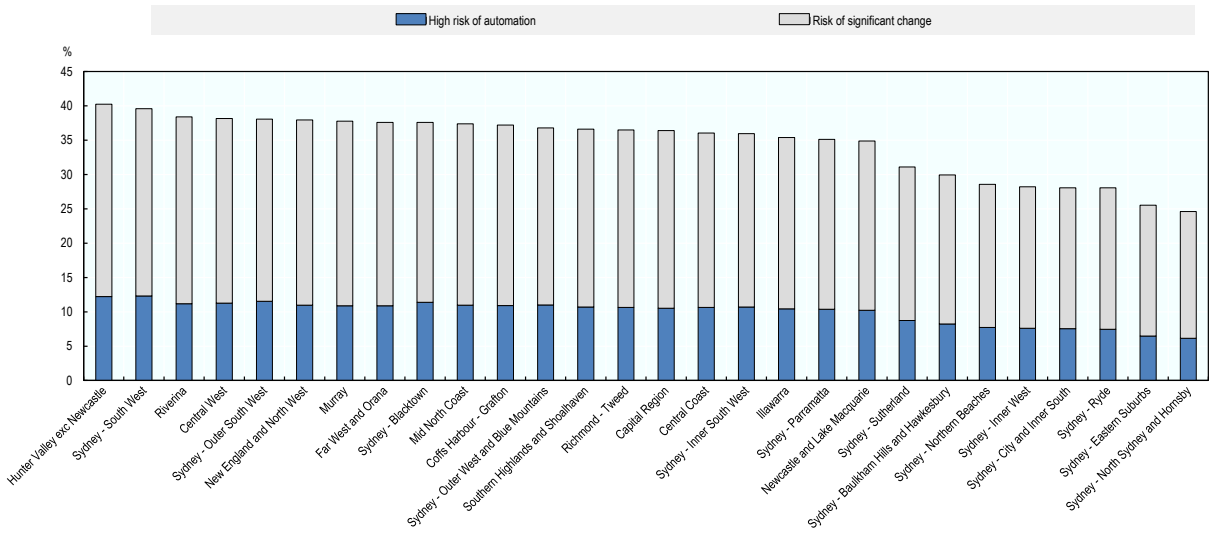
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Table 2.A.2. Number and share of jobs facing risk of significant change or high risk of automation in the Australian Capital Territory

Region	Total employment (2016)	Share of jobs at high risk of automation	Number of jobs at high risk of automation	Share of jobs at significant risk of change	Number of jobs vulnerable to significant change	Total share of jobs at risk of automation	Total number of jobs at risk of automation
Australian Capital Territory	197 000	8.0%	16 000	21.3%	42 000	29.3%	58 000

Note: numbers are rounded to the nearest '000.
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Figure 2.A.2. Share of jobs facing risk of significant change or high risk of automation across New South Wales



Source: OECD calculations on PIAAC and 2016 Australian Census.

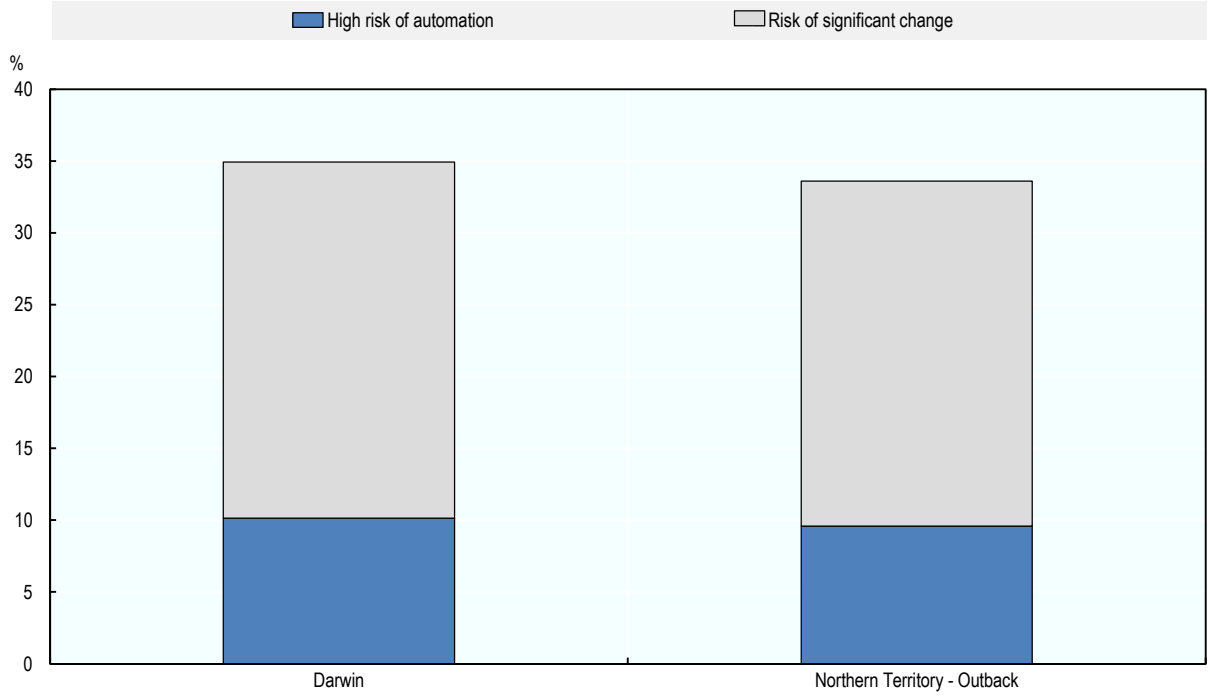
Annexe Table 2.A.3. Number and share of jobs facing risk of significant change or high risk of automation across New South Wales

Region	Total employment (2016)	Share of jobs at high risk of automation	Number of jobs at high risk of automation	Share of jobs at significant risk of change	Number of jobs vulnerable to significant change	Total share of jobs at risk of automation	Total number of jobs at risk of automation
Hunter Valley exc. Newcastle	108 000	12.2%	13 000	28.0%	30 000	40.2%	43 000
Sydney - South West	155 000	12.3%	19 000	27.3%	42 000	39.6%	61 000
Riverina	67 000	11.2%	8 000	27.2%	18 000	38.4%	26 000
Central West	84 000	11.3%	10 000	26.9%	23 000	38.2%	32 000
Sydney - Outer South West	119 000	11.5%	14 000	26.5%	32 000	38.1%	45 000
New England and North West	74 000	11.0%	8 000	27.0%	20 000	37.9%	28 000
Murray	49 000	10.9%	5 000	26.9%	13 000	37.8%	18 000
Far West and Orana	45 000	10.9%	5 000	26.7%	12 000	37.6%	17 000
Sydney - Blacktown	149 000	11.4%	17 000	26.2%	39 000	37.6%	56 000
Mid North Coast	73 000	11.0%	8 000	26.4%	19 000	37.4%	27 000
Coffs Harbour - Grafton	51 000	10.9%	6 000	26.3%	13 000	37.2%	19 000
Sydney - Outer West and Blue Mountains	144 000	11.0%	16 000	25.8%	37 000	36.8%	53 000
Southern Highlands and Shoalhaven	55 000	10.7%	56 000	25.9%	14 000	36.6%	20 000
Richmond - Tweed	94 000	10.6%	10 000	25.9%	24 000	36.5%	34 000
Capital Region	94 000	10.5%	10 000	25.9%	24 000	36.4%	34 000
Central Coast	137 000	10.6%	15 000	25.4%	35 000	36.0%	49 000
Sydney - Inner South West	241 000	10.7%	26 000	25.2%	61 000	35.9%	87 000
Illawarra	125 000	10.4%	13 000	24.9%	31 000	35.4%	44 000
Sydney - Parramatta	186 000	10.4%	19 000	24.7%	46 000	35.1%	65 000
Newcastle and Lake Macquarie	157 000	10.2%	16 000	24.7%	39 000	34.9%	55 000
Sydney - Sutherland	110 000	8.7%	10 000	22.4%	25 000	31.1%	34 000
Sydney - Baulkham Hills and Hawkesbury	113 000	8.2%	9 000	21.7%	25 000	29.9%	34 000

Sydney - Northern Beaches	127 000	7.7%	10 000	20.9%	27 000	28.6%	36 000
Sydney - Inner West	147 000	7.6%	11 000	20.6%	30 000	28.2%	41 000
Sydney - City and Inner South	170 000	7.5%	13 000	20.5%	35 000	28.1%	48 000
Sydney - Ryde	87 000	7.5%	6 000	20.6%	18 000	28.1%	24 000
Sydney - Eastern Suburbs	133 000	6.5%	9 000	19.0%	25 000	25.5%	34 000
Sydney - North Sydney and Hornsby	202 000	6.1%	12 000	18.5%	37 000	24.6%	50 000

Note: numbers are rounded to the nearest '000.
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Figure 2.A.3. Share of jobs facing risk of significant change or high risk of automation across the Northern Territory



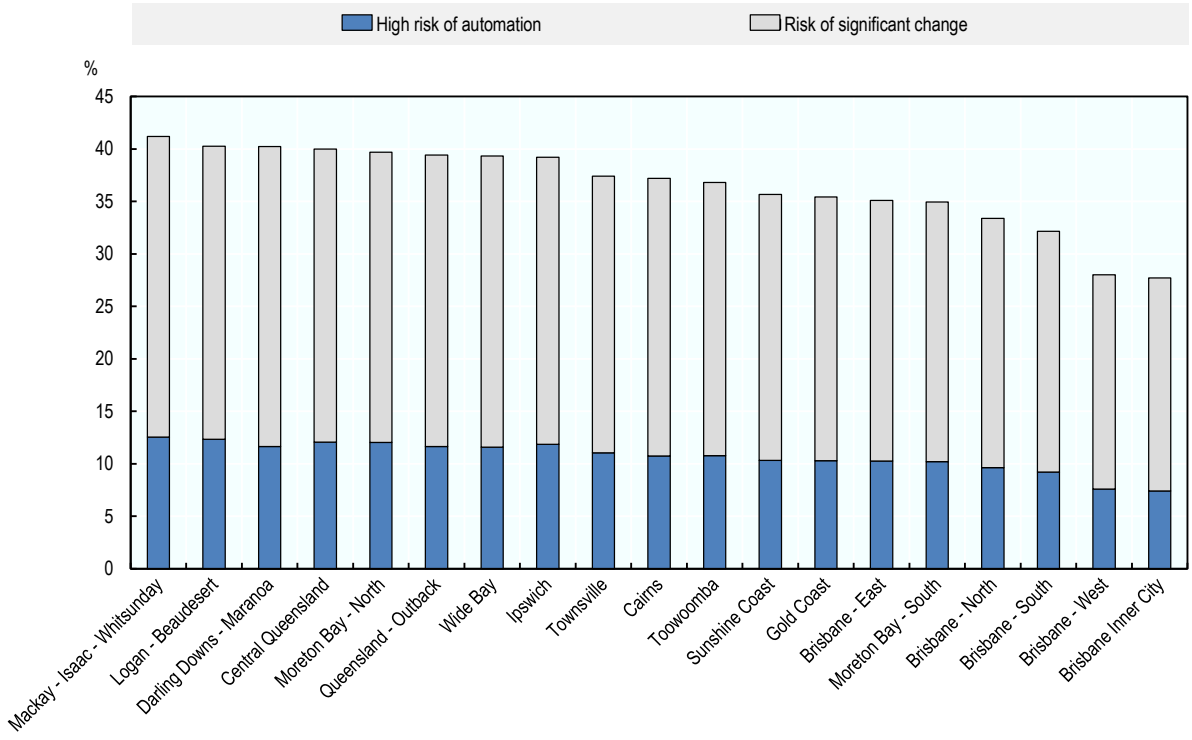
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Table 2.A.4. Number and share of jobs facing risk of significant change or high risk of automation across the Northern Territory

Region	Total employment (2016)	Share of jobs at high risk of automation	Number of jobs at high risk of automation	Share of jobs at significant risk of change	Number of jobs vulnerable to significant change	Total share of jobs at risk of automation	Total number of jobs at risk of automation
Darwin	68 000	10.1%	7 000	24.8%	17 000	34.9%	24 000
Northern Territory - Outback	29 000	9.6%	3 000	24.0%	7 000	33.6%	10 000

Note: numbers are rounded to the nearest '000.
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Figure 2.A.4. Share of jobs facing risk of significant change or high risk of automation across Queensland



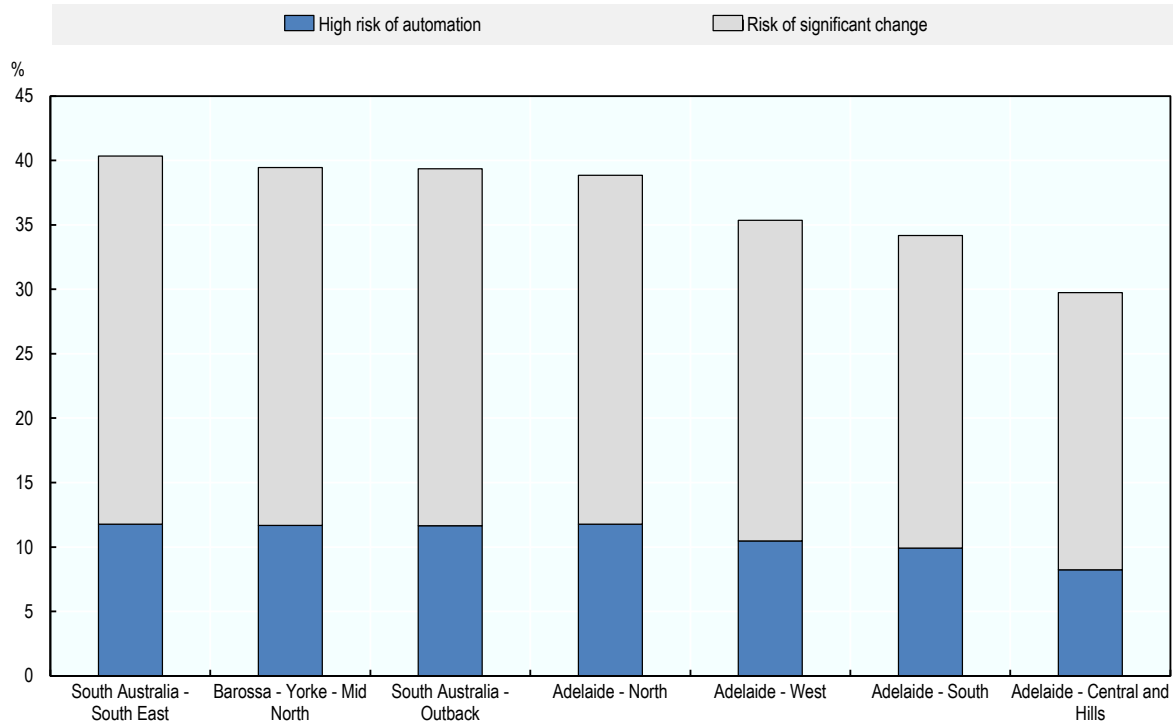
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Table 2.A.5. Number and share of jobs facing risk of significant change or high risk of automation across Queensland

Region	Total employment (2016)	Share of jobs at high risk of automation	Number of jobs at high risk of automation	Share of jobs at significant risk of change	Number of jobs vulnerable to significant change	Total share of jobs at risk of automation	Total number of jobs at risk of automation
Mackay - Isaac - Whitsunday	77 000	12.6%	10 000	28.6%	22 000	41.2%	32 000
Logan - Beaudesert	134 000	12.3%	17 000	27.9%	38 000	40.2%	54 000
Darling Downs - Maranoa	54 000	11.6%	6 000	28.6%	15 000	40.2%	22 000
Central Queensland	96 000	12.1%	12 000	27.9%	27 000	40.0%	38 000
Moreton Bay - North	93 000	12.0%	11 000	27.7%	26 000	39.7%	37 000
Queensland - Outback	33 000	11.6%	4 000	27.8%	9 000	39.4%	13 000
Wide Bay	98 000	11.6%	11 000	27.7%	27 000	39.3%	38 000
Ipswich	133 000	11.8%	16 000	27.4%	36 000	39.2%	52 000
Townsville	99 000	11.1%	11 000	26.3%	26 000	37.4%	37 000
Cairns	104 000	10.8%	11 000	26.5%	27 000	37.2%	39 000
Toowoomba	65 000	10.8%	7 000	26.1%	17 000	36.8%	24 000
Sunshine Coast	149 000	10.3%	15 000	25.3%	38 000	35.75	53 000
Gold Coast	262 000	10.3%	27 000	25.1%	66 000	35.4%	93 000
Brisbane - East	106 000	10.3%	11 000	24.8%	26 000	35.1%	37 000
Moreton Bay - South	94 000	10.2%	10 000	24.7%	23 000	35.0%	33 000
Brisbane - North	102 000	9.6%	10 000	23.7%	24 000	33.4%	34 000
Brisbane - South	165 000	9.2%	15 000	22.9%	38 000	32.1%	53 000
Brisbane - West	85 000	7.6%	6 000	20.4%	17 000	28.0%	24 000
Brisbane Inner City	138 000	7.45	10 000	20.3%	28 000	27.7%	38 000

Note: numbers are rounded to the nearest '000.
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Figure 2.A.5. Share of jobs facing risk of significant change or high risk of automation across South Australia



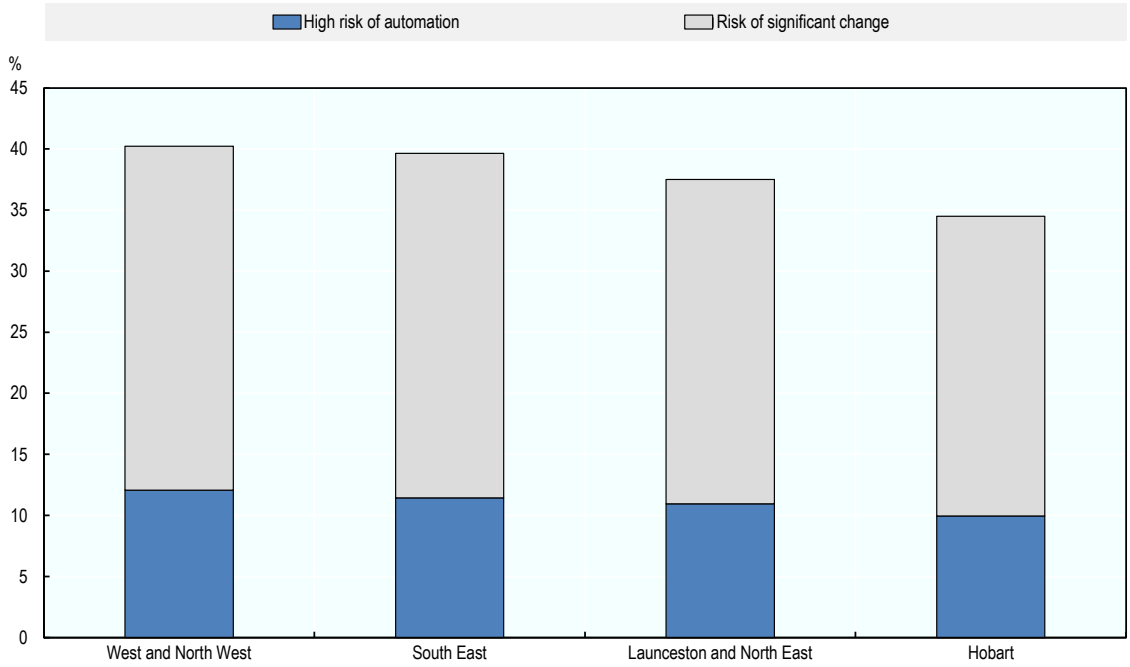
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Table 2.A.6. Number and share of jobs facing risk of significant change or high risk of automation

Region	Total employment (2016)	Share of jobs at high risk of automation	Number of jobs at high risk of automation	Share of jobs at significant risk of change	Number of jobs vulnerable to significant change	Total share of jobs at risk of automation	Total number of jobs at risk of automation
South Australia - South East	76 000	11.8%	9 000	28.6%	22 000	40.3%	31 000
Barossa - Yorke - Mid North	45 000	11.7%	5 000	27.8%	12 000	39.5%	18 000
South Australia - Outback	33 000	11.6%	4 000	27.7%	9 000	39.3%	13 000
Adelaide - North	176 000	11.8%	21 000	27.1%	48 000	38.9%	68 000
Adelaide - West	103 000	10.5%	11 000	24.9%	26 000	35.4%	36 000
Adelaide - South	162 000	9.9%	16 000	24.3%	39 000	34.2%	55 000
Adelaide - Central and Hills	135 000	8.2%	11 000	21.5%	29 000	29.7%	40 000

Note: numbers are rounded to the nearest '000.
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Figure 2.A.6. Share of jobs facing risk of significant change or high risk of automation across Tasmania



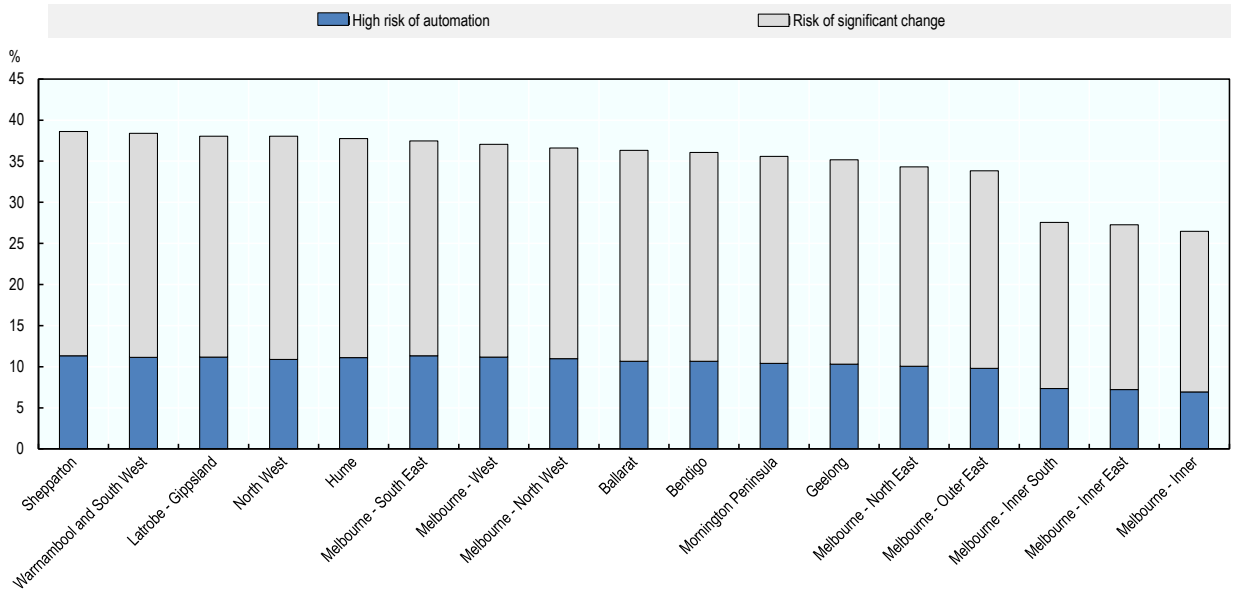
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Table 2.A.7. Number and share of jobs facing risk of significant change or high risk of automation

Region	Total employment (2016)	Share of jobs at high risk of automation	Number of jobs at high risk of automation	Share of jobs at significant risk of change	Number of jobs vulnerable to significant change	Total share of jobs at risk of automation	Total number of jobs at risk of automation
West and North West	43 000	12.1%	5 000	28.2%	12 000	40.2%	17 000
South East	14 000	11.4%	2 000	28.2%	4 000	39.7%	6 000
Launceston and North East	57 000	11.0%	6 000	26.6%	15 000	37.5%	21 000
Hobart	97 000	10.0%	10 000	24.5%	24 000	34.5%	33 000

Note: numbers are rounded to the nearest '000.
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Figure 2.A.7. Share of jobs facing risk of significant change or high risk of automation across Victoria



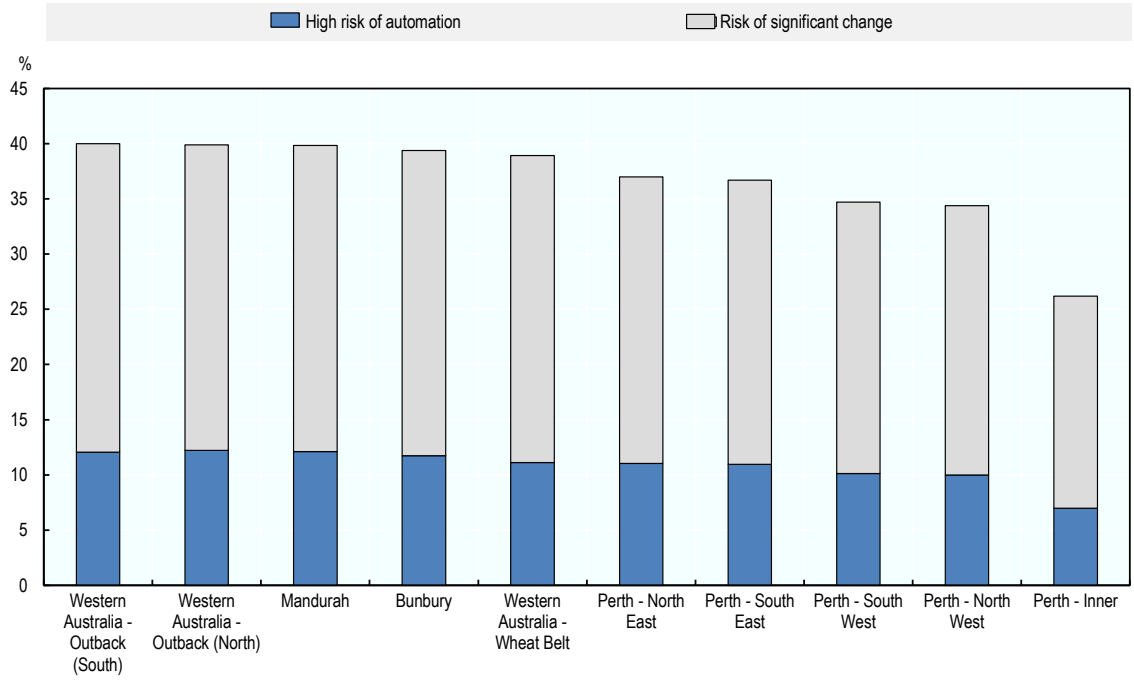
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Table 2.A.8. Number and share of jobs facing significant risk of change or high risk of automation

Region	Total employment (2016)	Share of jobs at high risk of automation	Number of jobs at high risk of automation	Share of jobs at significant risk of change	Number of jobs at significant risk of change	Total share of jobs at risk of automation	Total number of jobs at risk of automation
Shepparton	53 000	11.3%	6 000	27.3%	15 000	38.6%	21 000
Warrnambool and South West	54 000	11.2%	6 000	27.2%	15 000	38.4%	21 000
Latrobe - Gippsland	108 000	11.2%	12 000	26.9%	29 000	38.0%	41 000
North West	62 000	10.9%	7 000	27.1%	17 000	38.0%	24 000
Hume	73 000	11.1%	8 000	26.6%	19 000	37.7%	28 000
Melbourne - South East	329 000	11.3%	37 000	26.1%	86 000	37.5%	123 000
Melbourne - West	319 000	11.2%	36 000	25.9%	83 000	37.1%	118 000
Melbourne - North West	153 000	11.0%	17 000	25.6%	39 000	36.6%	56 000
Ballarat	66 000	10.7%	7 000	25.7%	17 000	36.3%	24 000
Bendigo	65 000	10.7%	7 000	25.4%	17 000	36.1%	23 000
Mornington Peninsula	128 000	10.4%	13 000	25.2%	32 000	35.6%	45 000
Geelong	123 000	10.3%	13 000	24.9%	30 000	35.2%	43 000
Melbourne - North East	227 000	10.0%	23 000	24.3%	55 000	34.3%	78 000
Melbourne - Outer East	244 000	9.8%	24 000	24.0%	59 000	33.8%	82 000
Melbourne - Inner South	195 000	7.3%	14 000	20.2%	39 000	27.6%	54 000
Melbourne - Inner East	166 000	7.2%	12 000	20.0%	33 000	27.3%	45 000
Melbourne - Inner	315 000	6.9%	22 000	19.5%	61 000	26.5%	83 000

Note: numbers are rounded to the nearest '000.
Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Figure 2.A.8. Share of jobs facing risk of significant change or high risk of automation across Western Australia



Source: OECD calculations on PIAAC and 2016 Australian Census.

Annexe Table 2.A.9. Number and share of jobs facing risk of significant change or high risk of automation across Western Australia

Region	Total employment (2016)	Share of jobs at high risk of automation	Number of jobs at high risk of automation	Share of jobs at significant risk of change	Number of jobs at significant risk of change	Total share of jobs at risk of automation	Total number of jobs at risk of automation
Western Australia - Outback (South)	52 000	12.1%	6 000	28.0%	14 000	40.0%	21 000
Western Australia - Outback (North)	44 000	12.2%	5 000	27.7%	12 000	39.9%	18 000
Mandurah	36 000	12.1%	4 000	27.7%	10 000	39.8%	14 000
Bunbury	76 000	11.7%	9 000	27.6%	21 000	39.4%	30 000
Western Australia - Wheat Belt	58 000	11.1%	6 000	27.8%	16 000	38.9%	22 000
Perth - North East	117 000	11.0%	13 000	26.0%	31 000	37.0%	43 000
Perth - South East	224 000	10.9%	25 000	25.8%	58 000	36.7%	82 000
Perth - South West	184 000	10.1%	19 000	24.6%	45 000	34.75	64 000
Perth - North West	257 000	10.0%	26 000	24.4%	63 000	34.45	88 000
Perth - Inner	83 000	7.0%	6 000	19.2%	16 000	26.2%	22 000

Note: numbers are rounded to the nearest '000.
Source: OECD calculations on PIAAC and 2016 Australian Census.

3 Job polarisation and changing skills needs at the local level in Australia

COVID-19 risks exacerbating skills mismatches in Australia. This chapter explores recent evidence on firm hiring trends in light of COVID-19. It also looks at available evidence on how skills mismatches and job polarisation were affecting Australian regions before COVID-19. As Australia recovers from the pandemic and prepares for the future of work, action on both the supply and demand side of the labour market will be crucial to ensure workers can make good transitions into new and emerging jobs.

In Brief

As local labour markets recover from the pandemic, skills development will be crucial to prepare workers for the upturn

- **COVID-19 has affected labour demand in Australia as across the OECD, however Australia has proven resilient**. Job vacancies began recovering in Australia as early as August 2020, following a historical decline in hiring. The initial drop in vacancies reflected the immediate impacts of the COVID-19 pandemic and the associated restrictions on people and businesses.
- **Prior to COVID-19, recruitment difficulties and skills mismatches were prevalent across the Australian labour market.** Looking at the available evidence before COVID-19, Australian workers report skills mismatches at a higher rate than the OECD average. Many states and territories have large qualification mismatches which demonstrate that more can be done to better ensure that the training system is meeting employer demands.
- **Over the past decade, the Australian labour market has polarised, primarily shifting towards high-skill jobs**. 37 of 89 regions (or 42%) experienced a decline in middle skills jobs, whereas all 89 saw an increase in high skilled jobs. Looking at the state level, the decline in the employment share of middle-skill jobs was sharpest in Victoria, where it amounted to about 4.4 percentage points, while it was less pronounced in the Northern Territory (-0.7 percentage points). The employment share of high-skill jobs increased by about 3.8 percentage points in Victoria, the largest increase recorded across Australian states and territories.
- **Skills development and flexibility will be more important than ever in a post-pandemic world of work**. Action on both skills supply and demand are needed. Digital skills are at the heart of transversal competences needed for workers to broaden their employment opportunities. While developing skills and being flexible is critical, those skills also need to be effectively deployed and used. Australian employers generally make good use of workers' skills in the workplace, but there is an opportunity to further promote the emergence of high-performance work practices (HPWPs) in Australia.

Introduction

COVID-19 has impacted labour and skills demand in Australia as it has elsewhere. Labour shortages and skills mismatches, alongside timeliness issues in implementation of new technology, were some of the factors hampering productivity in Australia prior to the pandemic. Shortages and mismatches are emerging alongside job polarisation whereby some local labour markets are shedding middle-skill jobs and shifting mainly towards high-skill jobs. Developing digital skills will be critical to meeting demands from emerging job opportunities. Employers will also have to ensure the available skills are put to good use in the workplace to maximize productivity gains. Section 3.1 of this chapter highlights recent trends in labour demand and hiring across regions in Australia. Section 3.2 overviews evidence on how labour shortages and skills mismatches were affecting local labour markets in Australia prior to the pandemic. Sections 3.3 and 3.4 delve into local trends in job polarisation, highlighting which regions are gaining or losing low, middle, and high skilled jobs. Finally, section 3.5 highlights actions needed on both the skills supply and demand sides to prepare workers for the future of work, with a focus on digital skills and skills use in the workplace.

3.1. Labour demand in Australia bounced back quickly after being hit by COVID-19

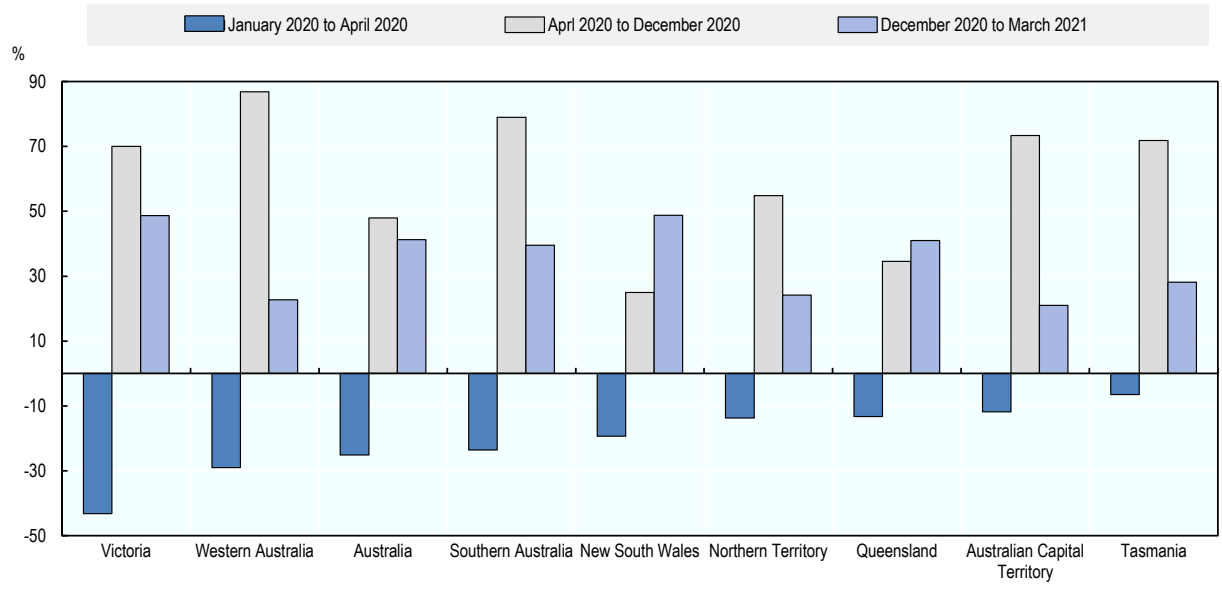
3.1.1. Many Australian regions experienced a significant drop in hiring as a result of the initial COVID-19 shock

COVID-19 hit some Australia regions hard with a significant drop in overall hiring. Looking at Burning Glass (BG) data between January and April 2020, Victoria experienced the sharpest drop in vacancies, which almost halved. On the other hand, Tasmania saw an overall decline of only 10%.

This being said, looking at just regions in Australia does not reveal how some jobs and occupations experienced an even sharper reduction in hiring due to COVID-19. The drop in vacancies was sharpest for hospitality, food, and tourism jobs in Australia, with a reduction of 54%. The least impacted were jobs in science and research which can increasingly be performed through teleworking, and jobs in healthcare including nursing. The demand for hospitality, food, and tourism jobs dropped the most significantly in Australian Capital Territory (-76%), followed by New South Wales (-56%), and Victoria (-66%). Online job vacancies in healthcare including nursing increased by 39% in Tasmania, and by 25% in New South Wales.

Figure 3.1. Online job postings in light of COVID-19 have varied across Australia

Percentage change in online job postings since January 2020



Source: Calculations based on data from Burning Glass Technologies.

Box 3.1. Using Burning Glass Technology for regional labour market analysis

The BG data is a tabulation of all on-line job postings collected by software company Burning Glass Technologies. The information available in the dataset includes job title and description, location, time of posting, occupational codes, (broadly defined) required skills and some other attributes.

Burning Glass Technologies uses a web crawling algorithm to collect information on vacancies from online sources in real time and aims to include the universe of online job postings. The algorithm parses each job announcement into text categories and applies semantic analysis to standardize text entries. The resulting dataset contains around 70 entries for each announcement including job title, date of posting, location, identifiers of occupation and industry, job requirements, employer's name, salary and job type. Location variables include region, city and geographical coordinates (if available) and are based on the finest locational detail specified in the job ad. For example, if an ad specifies a city, the name of the city is used to fill data fields for geographical coordinates, city and region. If the most granular location specified is a district within a city, the geographical coordinates are then based on the district.

The advantages of the BG data are its detailed content, granularity, timeliness and the coverage. The data can be successfully used to study how the demand for occupations and skills changes over time and within researcher-defined units of analysis, from firms to countries. The limitations of the BG data for empirical analysis arise from two sources: how employers use Internet for job announcements and how the BG algorithm processes the ads. The non-standardised nature of the collected information may also complicate analytical work, as meaningful groupings of the data may be a challenging and time-consuming task in certain circumstances.

Source: Knutsson, P., A. Tsvetkova and A. Lembcke (forthcoming), "Using Burning Glass data for regional analysis: Opportunities and caveats", OECD Publishing, Paris.

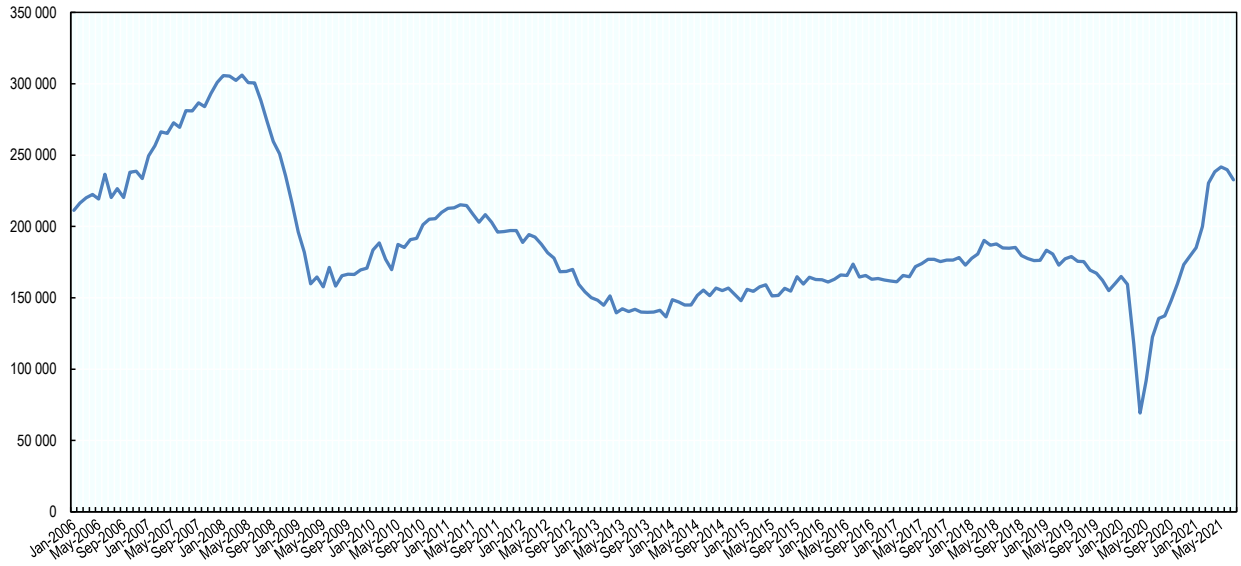
3.1.1. Job vacancies have rebounded from the pandemic

The significant reduction in job vacancies between February-May 2020 reflected the immediate impacts of COVID-19 and associated restrictions on people and businesses. The pandemic resulted in an overall decline of 42.4% in hiring according to Australia's Internet Vacancy Index (IVI), which was a much steeper decrease in overall job vacancies than previous downturns in Australia. For example, the largest single quarter decline in the 1980s recession was 18.6% (in May 1982) and 26.7% in the 1990s recession (in November 1990) (Australian Bureau of Statistics, 2021[1]).

However, by October 2020, labour demand exceeded pre-pandemic levels across Australia. Job vacancies increased by 74% (68 000 vacancies) in Australia between May 2020 and October 2020. Job vacancies were added for 13 consecutive months between May 2020 and May 2021 with a total gain of 150 000 vacancies, before dipping down slightly in July 2021 (-9 000 vacancies since May 2021). (Australian Bureau of Statistics, 2021[1]).

Figure 3.2. Job vacancies have recovered in Australia, following a significant drop at the beginning of the COVID-19 pandemic

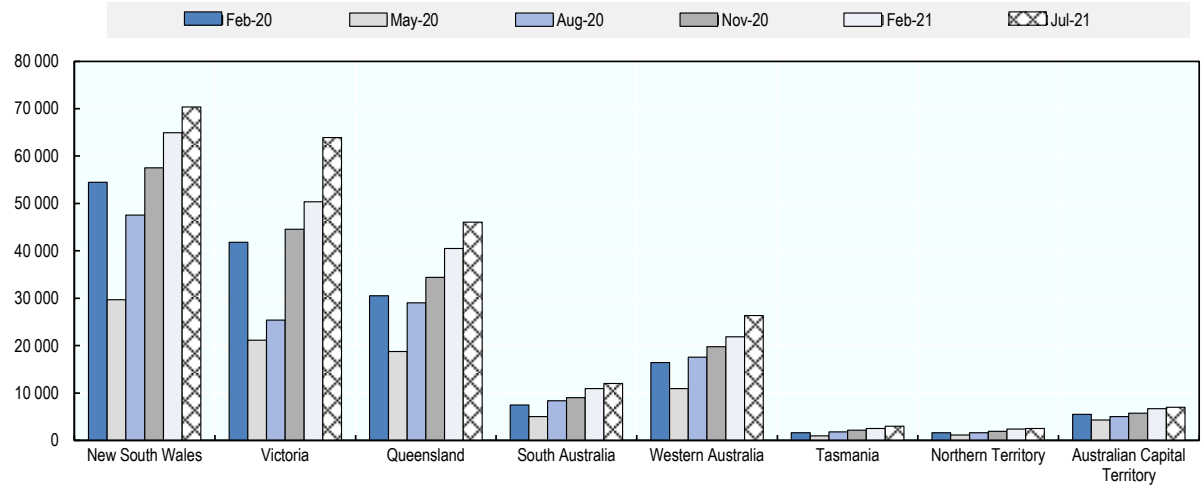
Number of job vacancies (Internet Vacancy Index)



Source: Australian Government Job Vacancy report, July 2021.

Figure 3.3. The extent of job vacancy recovery have varied across states and territories

Number of job vacancies across Australian states and territories



Source: Australian Bureau of Statistics, July 2021.

3.1.2. COVID-19 has had different impacts across the skill distribution

COVID-19 has highlighted inequalities in the labour market, with some workers more vulnerable to job losses. Most low-skilled, low-wage workers, and young people have been hit particularly hard by the pandemic, as they tend to work in the sectors most at risk, are less likely to hold jobs allowing them to

telework, and are more likely to be on temporary contracts. While these groups have been hit hard by the pandemic, some of them have actually led the way in terms of economic recovery. The Social economy could play an important role in helping the most disadvantaged groups.

Economic shocks can lead many employers to permanently raise skill requirements as they retool their operations to become more competitive and viable, making many jobs further out of reach for some job seekers (Austin and Hershbein, 2020[2]). Within Australia, job advertisements had fallen across all skill level groups in 2020, but started to rebound in August for some categories of workers. Skill Level 2 occupations (corresponding to Advanced Diploma or Diploma level education) recorded the largest decrease over 2020, down by 29.4% (4 900 job advertisements) since August 2019. Job advertisements increased across the two highest skill level groups in August 2020. The strongest increase was recorded for Skill Level 1 occupations (commensurate with a bachelor's degree or higher education level), with job advertisements up by 5.3% (or 2 600 job advertisements) over the month of August (National Skills Commission, 2020[3]). On the other hand, recruitment for the three lower skilled occupational groups (Skill Levels 3 to 5) continued to decline in August. The largest decrease was recorded for Skill Level 3 occupations (corresponding to Certificate IV or III education level), with job advertisements down by 2.8% (or 490 job advertisements) over the month (National Skills Commission, 2020[3]). Although by April 2021, these indicators surpassed their pre-pandemic levels, such a shock will still leave a lasting impression on the labour market and likely to cause many employers to raise skill requirements for certain jobs.

Box 3.2. Changing labour market skill requirements amidst transition to net-zero emissions

Policies to reach net-zero greenhouse gas (GHG) emissions as targeted by many OECD countries for 2050 will inevitably reshape local labour markets. There will be both job gains and losses due to the net-zero transition. Relative employment gains are estimated to be the largest in renewable power production and recycling of materials. Policies to promote renewable energy and other low-carbon activities will create demand for new service jobs. Overall, renewable energy is expected to be more employment-intensive than the fossil-fuelled energy it replaces.

Sub-sectors of mining and manufacturing will face relatively higher risk of job losses. And while agriculture is not a sector that can be broadly identified as being subject to employment risks, it will be subject to important transformations, for example with respect to agricultural practices to reduce fertiliser use and carbon sequestration, including through afforestation. Australian regions which depend on these sectors will likely undergo major shifts in the labour market as pre-existing trends towards automation and digitalisation will further change skill requirements for jobs. As labour markets across Australia and the OECD transition from low-skill to higher-skill jobs, there will be greater demand for workers with strong digital skills. Expanding skills needed to address these challenges will need to be a place-based priority for helping workers transition to the labour market of the future.

Source: OECD (2021[4])

3.1.3. COVID-19 has also changed employers' future recruitment intentions

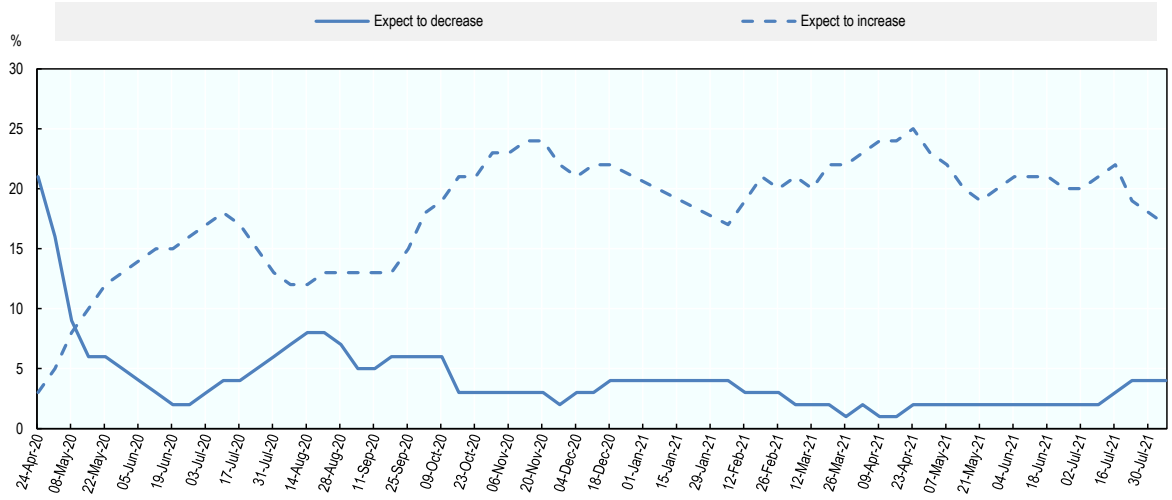
COVID-19 has led not only to job losses but also changing hiring requirements among firms. The National Skills Commission's *Recruitment Experiences and Outlook Survey* shows that in the four weeks leading up to November 13, 2020, some 47% of employers surveyed were currently recruiting or had recruited in the past month. The rate of employers recruiting has increased markedly from 24% recorded in the four weeks up to June 26, 2020. Some 43% of recruiting employers reported having recruitment difficulty, with this rate remaining relatively steady since the end of September 2020. The most commonly

reported reasons for employers' recruitment difficulty were a lack of suitable applicants, and a lack of applicants in general.

COVID-19 has had an impact on employers' staffing expectations. While at the beginning of the 2020, employer surveys conducted by the National Skills Commission were showing that the majority of employers were expecting their staff to increase in the following months, this changed when Australia closed borders due to the pandemic. By late April 2020, 21% of surveyed employers were expecting to decrease their staff in the near future. Only 3% were expecting staff to increase. Employer expectations about staffing have improved as of the end of April and throughout the following weeks. By 6 August 2021, the proportion of businesses expecting to increase staff in the coming months stood at 19% while the proportion looking to decrease staff stood at 4%.

Figure 3.4. Employers' staffing expectations increased after the initial COVID-19 shock

Percentage of employers that expected to decrease/increase staff, April 2020 to July 2021



Source: Recruitment Experiences and Outlook Survey, National Skills Commission, Australian Government.

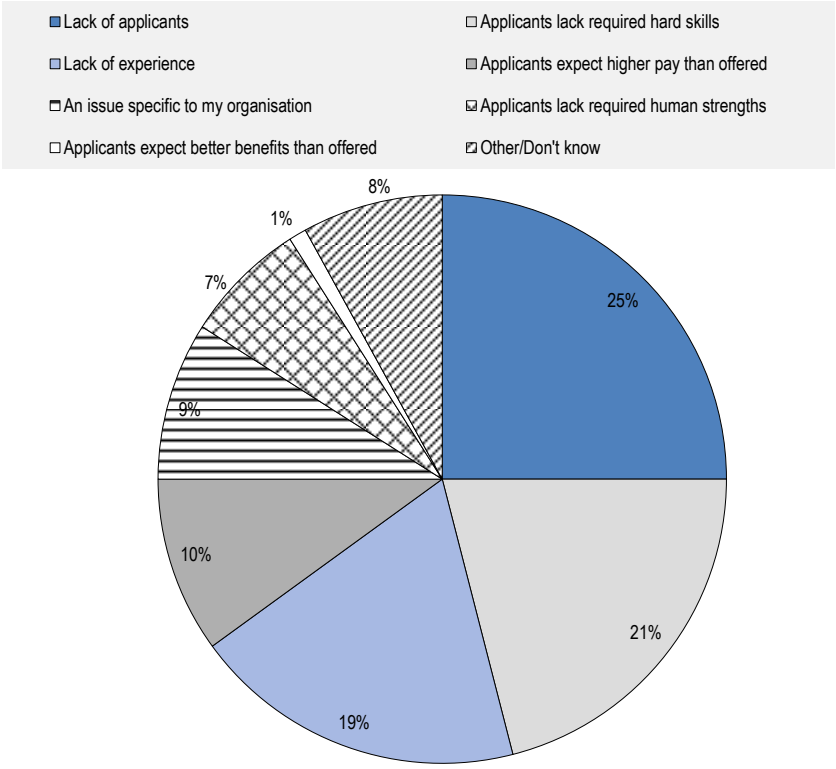
3.2. Skills mismatches were a challenge in Australia before COVID-19 hit

3.2.1. Before COVID-19 recruitment difficulties have been an issue in Australia with different impacts across sectors

Finding the right talent and skills has been a longstanding challenge among Australia firms. For example, about 34% of employers in Australia reported that they could find the talent they needed, according to the 2018 Manpower Group Talent Shortage Survey. The number was higher for medium-sized organisations (50-249 employees), standing at 43% in 2018. The share of employers reporting shortages was lower in Australia than around the world on average, where it stood at 45%. In addition, this share has been declining in Australia over the past decade, from a high of 61% of employers in 2007. In 2018, it was however still higher than in 2006, when it stood at 32% (ManpowerGroup, 2018[5]).

One in four employers reported that the lack of suitable applicants was the main reason why they could not find the skills they need. As companies digitalise, automate and transform, finding candidates with the right blend of technical skills becomes more important than ever. Yet, many employers report the lack of required hard skills (e.g., programming) as the driver of skills shortage (21%).

Figure 3.5. The lack of applicants is the main driver of skills shortage in Australia



Source: Manpower Group Talent Shortage Survey, 2018.

3.2.2. Skills mismatches hamper productivity across Australian states and territories

While the skills provided by the education and training system need to correspond to those required by firms, it is also important to ensure that the labour market matches workers to jobs where they can put their skills to the best use. Although there is no universally agreed upon definition, mismatch can be measured with reference to different dimensions, whether skills, fields of study or qualifications. Skill mismatch describes situations in which workers' skills exceed (over-skilling) or fall short (under-skilling) of those required for their job under current market conditions. Field-of-study mismatch arises when workers are employed in a different field from what they have specialised in. On the other hand, qualification mismatches arise when workers have an educational attainment that is higher (over-qualification) or lower (under-qualification) than that required by their job (OECD, 2017[6]).

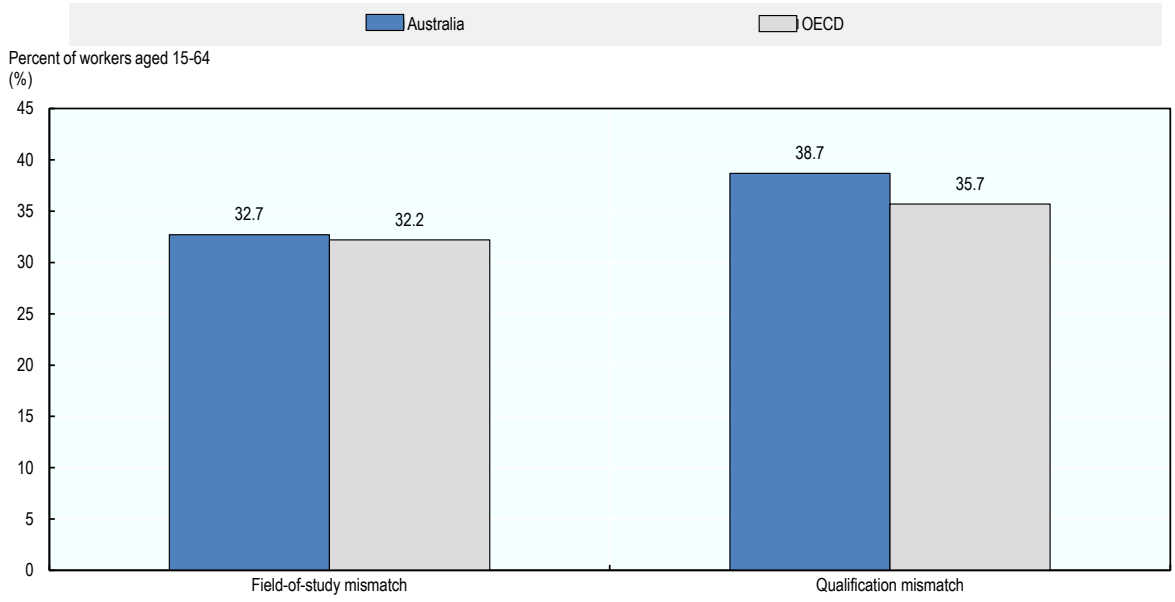
Some mismatch is frictional and results from workers accepting jobs in which they are mismatched by field of study as they search for the job that best fits their skills and interests. Mismatch also results from the fact that individuals' decisions to invest in training were made in the context of an economy that has changed; or from changes in an economy's or occupation's skill demand as a result of technological change, the global division of labour, economic cycles and changes in the way firms are organised. The seeming inevitability of mismatch does not preclude countries from developing policies and programmes to reduce it or to limit their negative effects on individuals' and an economy's outcomes (Montt, 2015[7]).

OECD research finds that Australia has a high rate of skills mismatch, suggesting that labour resources might be more efficiently allocated (Adalet McGowan and Andrews, 2015[8]). Mismatches between workers' skills and the demands of their jobs can have negative effects on different levels. At the

individual level, they can affect job satisfaction and wages. At the firm level, they can increase job turnover and potentially reduce productivity, and at the macroeconomic level, they can increase unemployment and reduce growth through the waste of human capital and the implied reduction in productivity (OECD, 2018[9]). An increase in job turnover can have the effect of rising wage competition and a more broadly skilled workforce but it can also exacerbate polarisation and leave some workers behind. Australia's large distances between main population centres play a role in explaining mismatches. Inter-state differences in education and vocational training systems may be hindering labour mobility. OECD empirical work on factors driving skill mismatch suggests Australia would also benefit from making housing supply more responsive (OECD, 2018[10]).

Both field of study and qualification mismatches in Australia are slightly higher than the OECD average (see Figure 3.6). Several individuals enter a field-of-study with the expectation to pursue a career in that field and, if mismatched, workers face the disappointment of unmet expectations. Mismatched workers by field may also be more likely to earn a lower salary compared to their matched peers. They are also less likely to be satisfied in their work. For employers, the consequences that field-of-study mismatch brings on workers translate into lower levels of productivity, higher on-the-job-search for other jobs and, potentially, higher turnover (Montt, 2015[7]).

Figure 3.6. Field of study and qualification mismatch in Australia and the OECD

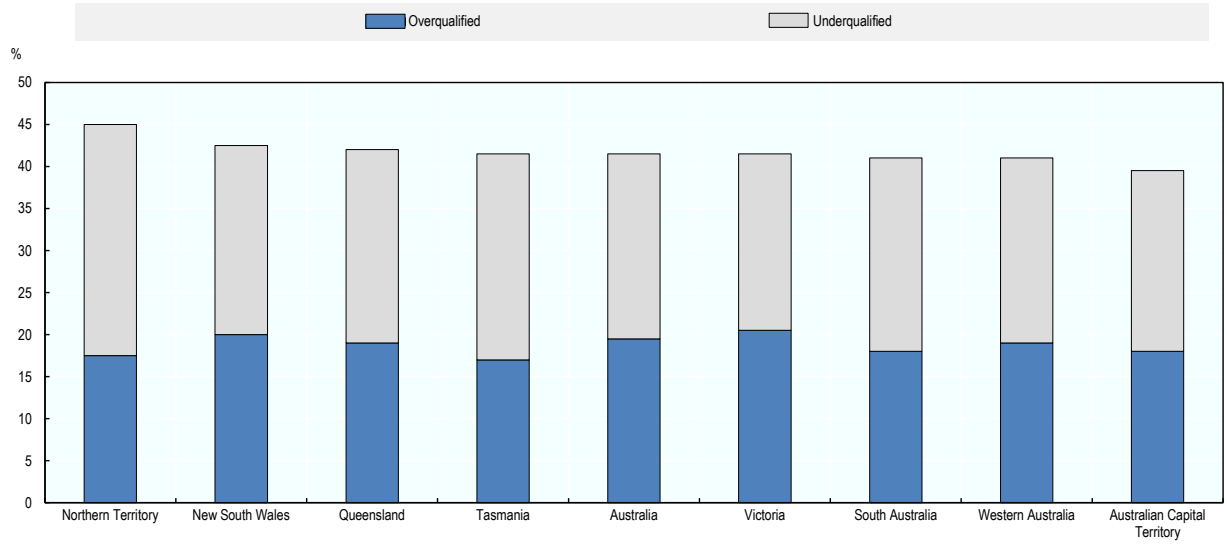


Source: OECD Statistics, 2016.

Looking more specifically at qualification mismatches, there are strong variations across Australian regions. Qualification mismatches are highest in the Northern Territory and lowest in the Australian Capital Territory (see Figure 3.7). In all states and territories, under-qualification represents a larger issue than over-qualification, with more than 20% of individual workers in each state and territory achieving a lower level of education than the modal level for all workers in that occupation. Under-qualification leads to a negative impact on productivity, as workers lack the qualifications needed to perform the job. Prolonged periods of under-qualification growth can be a sign of increasing skills shortages, as employers do not find workers with the qualifications they need for the job and therefore hire under-qualified staff (OECD, 2017[6]). Over-qualification is highest in Victoria among all states and territories, with about

20.3% of workers who are over-qualified for the job. Over-qualification poses concerns regarding the use of skills in the workplace, as it may affect job satisfaction and ultimately productivity.

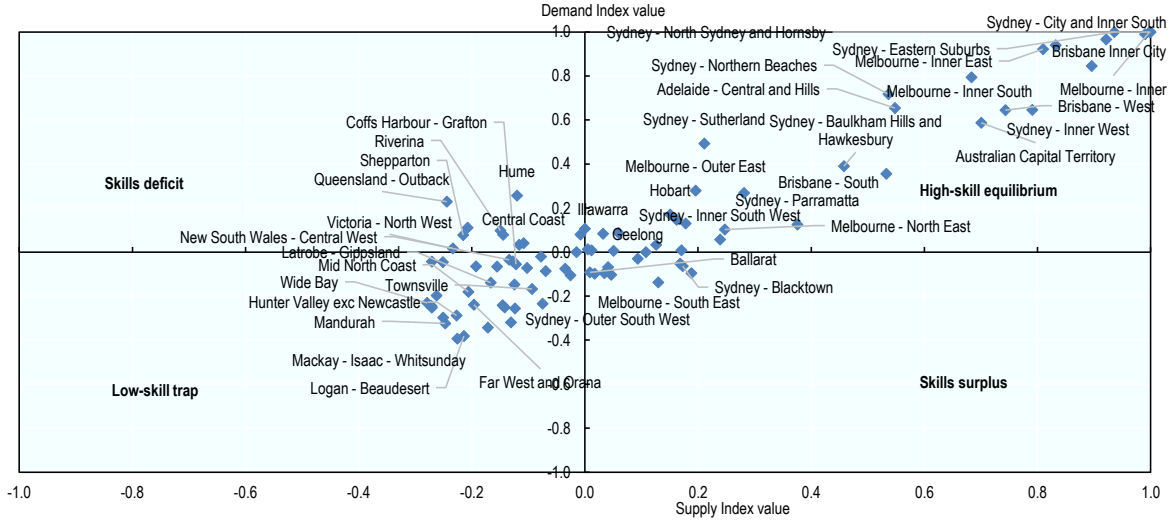
Figure 3.7. Underqualification tends to be more prevalent than overqualification across Australia



Source: OECD calculations based on the 2016 census.

Looking at the occupational structure and skills available in the workforce across regions in Australia shows that most of them are in a high-skill equilibrium, although differences exist (see Figure 3.8). Capital city regions tend to be in a high-skill equilibrium, as they are characterised by a strong supply of skills (measured by educational attainment), high employment shares in high-skill occupations and high earnings. This is the case for example of Sydney – City and Inner South, Brisbane - Inner City, Melbourne - Inner, Adelaide – Central and Hills, Hobart, Australian Capital Territory, among others. On the other hand, more rural and remote regions such as Mackay – Isaac – Whitsunday, Logan – Beaudesert and Far West and Orana, find themselves in a low-skill trap, whereby both the demand and supply of high-skill jobs and individuals are lacking. These regions face a particularly challenging situation, as they lack high-skill jobs and they also struggle to attract higher-skill individuals. Other regions, including for example Hume, Coffs Harbour – Grafton, Riverina, and Shepparton, are in a skills deficit, suggesting that although the demand for high-skill jobs is present, this is not matched by an adequate supply of labour force. Finally, few regions, such as Sydney – Blacktown, Ballarat, and Melbourne – South East, are facing a skills surplus, suggesting that the supply of high-skill individuals is not met by the availability of high-skill jobs.

Figure 3.8. The majority of Australian regions are in a high-skill equilibrium, but differences exist



Note: Few region labels are omitted for readibility.
Source: OECD calculations on Census 2016.

3.3. Job polarisation is shifting labour market dynamics across Australia

3.3.1. The Australian labour market is polarising resulting in an overall decline in middle skill jobs

Labour markets across the OECD have become more polarised over the last decades, with declines in the share of employment in middle-skill jobs relative to jobs with higher or lower skill levels (OECD, 2017[11]). Polarisation has taken place across most OECD countries in recent decades, though these changes have unfolded differently across regions. Across the OECD, polarisation patterns have been especially noted in the United States and United Kingdom since the 1980s (Goos and Manning, 2007[12]) (Autor and Dorn, 2009[13]). In continental Europe, research suggests occupational changes have followed multiple patterns depending on the period analysed and methodology used, though polarisation and upskilling are prominent (Eurofound, 2015[14]; Fernández-Macías, 2012[15]; Goos, Manning and Salomons, 2009[16]; OECD, 2019[17]). As occupational structures are not evenly distributed within countries, however, the OECD has found the relative share of occupations to change differently across regions. Indeed, since 2000, evidence suggests regional variations in the share of low-, middle-, and high-skilled jobs to be as high as 20% in certain countries, such as the United States, Spain and Italy (OECD, 2020[18]).

The Australian labour market has shifted primarily towards high-skill jobs (see Figure 3.9). Between 2006 and 2016, the employment share of high-skill jobs has increased by about 3.4 percentage points, while the share of low-skill jobs has increased by 0.4 p.p. and that of middle-skill jobs decreased by about 3.6 p.p. The shift towards high-skill jobs has been going on for some decades in Australia. Previous OECD work on the 1990s-2010s period had found that employment shares in Australia had shifted towards high-skill jobs, while the share of both middle- and low-skill jobs had decreased. The employment share of high-skill jobs grew by nearly 20 percentage points between the mid-1990s and the mid-2010s.

While there is no universal consensus, digitalisation and automation have been identified as key drivers of job polarisation. According to the *Routine-biased technical change theory* (RBTC), digitalisation and automation substitute human labour in jobs involving easy-to-codify routine manual and cognitive tasks (Autor, Levy and Murnane, 2001[19]). Jobs that involve routine tasks tend to be found in the

middle of the skills distribution. As such, RBTC sees automation as a driver of job polarisation, as algorithms, artificial intelligence (AI) and new technologies progressively replace jobs in the middle of the skills distribution. Such middle-skill jobs include clerks, cashiers, telephone operators, bank tellers or bookkeepers (OECD, 2017[11]). However, recent research has showed that, contrary to common belief, new forms of technology, such as AI, could change the types of jobs most at risk of automation going forward (Muro, Whiton and Maxim, 2019[20]). Research also suggests labour market institutions contribute to occupational change and polarisation. For instance, the OECD has found that higher union density rates may help mitigate polarisation by reducing job suppression in certain parts of the skills distribution (OECD, 2017[11]). Research on the topic also suggests many of these factors do not explain polarisation on their own, but rather constitute a set of variables that interact with each other to shape occupational change (OECD, 2015[21]).

Research suggests that, across the OECD, polarisation has taken place primarily within-industries (accounting for two-thirds of occupational change) rather than across industries (one third of occupation change) (OECD, 2017[11]). In this way, the decline in middle-skill occupations has occurred across almost all economic sectors, often offset by a rise in high-skilled occupations within sectors. Certain sectors, such as manufacturing industry, have tended to undergo a higher degree of loss in middle-skilled jobs. Moreover, the OECD has found occupational change to vary significantly within countries, with different changes in occupational distributions based on local characteristics (OECD, 2018[22]).

Box 3.3. Defining low-, middle-, and high-skill jobs

Estimates of labour market polarisation are sensitive to the methodology used to define low-, middle-, and high-skill occupations. The skill level of occupations can be approximated in different ways, including by educational requirements, complexity of tasks, and wages. The OECD methodology divides occupations into three skill categories based on their ILO International Standard Classification of Occupations (ISCO-88) major group. ISCO-88 categorises occupations into ten major groups. The ILO considers the type of work performed – or a job – and the skills required to perform the job, to group them into categories. The ILO defines these concepts the following way focusing on the complexity of tasks:

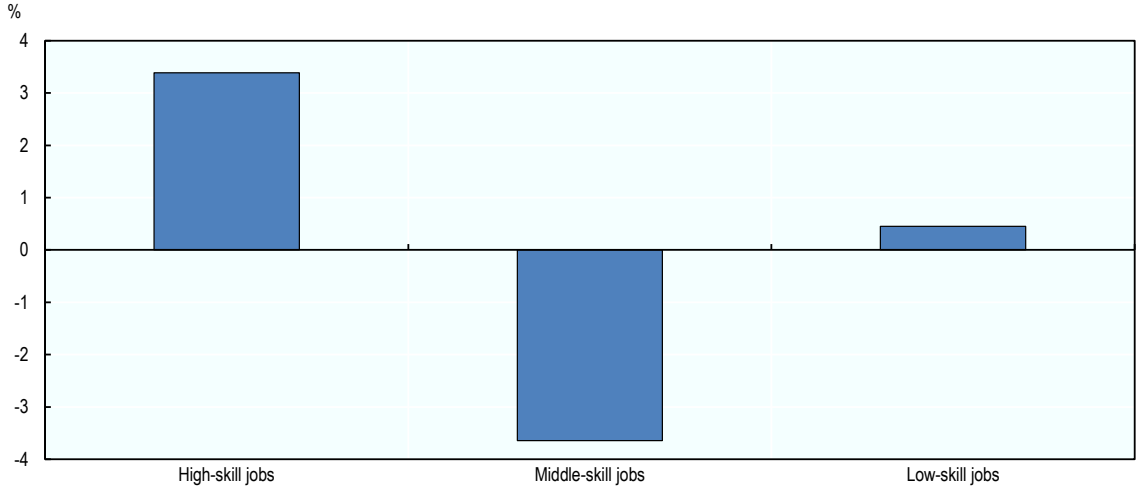
- A job is defined as "a set of tasks and duties performed, or meant to be performed, by one person, including for an employer or in self employment". An occupation "refers to the kind of work performed in a job. The concept of occupation is defined as a 'set of jobs whose main tasks and duties are characterised by a high degree of similarity'".
- A skill is defined as "the ability to carry out the tasks and duties of a given job". Two dimensions are considered: (a) skill level, defined as "a function of the complexity and range of tasks and duties to be performed in an occupation", and (b) skill specialisation, defined by "the field of knowledge required, the tools and machinery used, the materials worked on or with, as well as the kinds of goods and services produced".

Thus, the OECD considers high-skill occupations to include jobs classified under the ISCO-88 major groups 1, 2, and 3. That is, legislators, senior officials, and managers (group 1), professionals (group 2), and technicians and associate professionals (group 3). Middle-skill occupations include jobs classified under the ISCO-88 major groups 4, 7, and 8. That is, clerks (group 4), craft and related trades workers (group 7), and plant and machine operators and assemblers (group 8). Low-skill occupations include jobs classified under major groups 5 and 9. That is, service workers and shop and market sales workers (group 5), and elementary occupations (group 9).

Source: ILO (2012[23])

Figure 3.9. Job polarisation in Australia

Percentage point change in the employment share of high-, middle- and low-skill jobs, 2006-2016



Source: OECD calculations on Population and Housing Census.

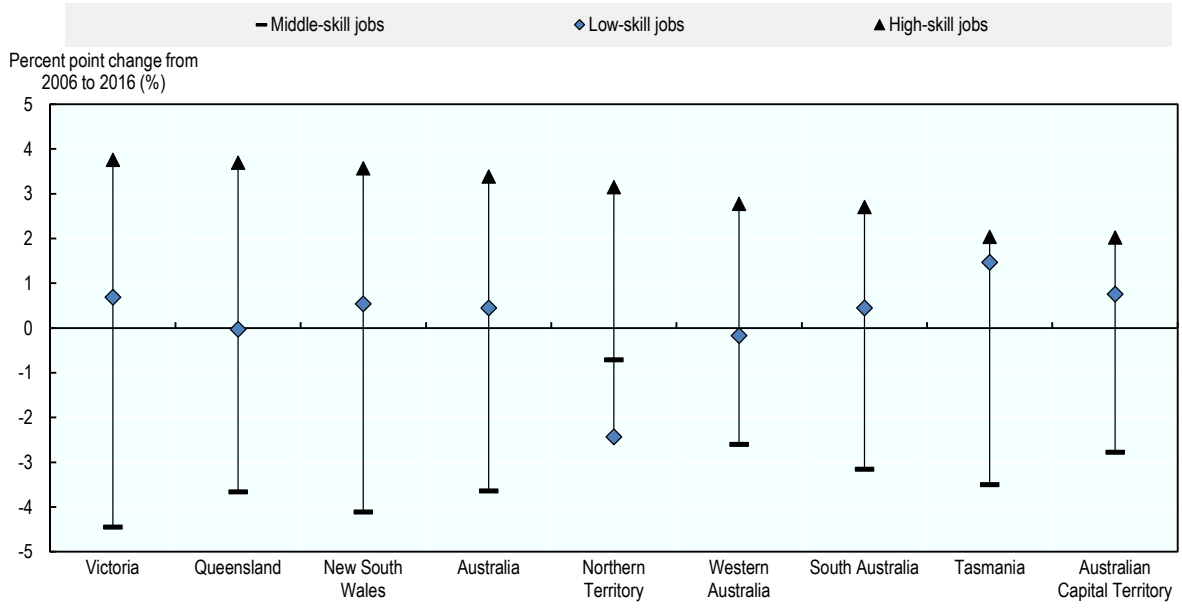
3.3.2. All Australian states and territories have primarily shifted towards high-skill jobs

In all Australian states and territories, employment shares have shifted from middle-skill to high-skill jobs between 2006 and 2016 (see Figure 3.10). The decline in middle-skill jobs was sharpest in Victoria, where it amounted to about 4.4 percentage points, while it was less pronounced in Northern Territory (-0.7 p.p.). The employment share of high-skill jobs increased by about 3.8 percentage points in Victoria, the largest increase recorded across Australian states and territories. Northern Territory and Western Australia are the only states and territories where the employment shares of both middle-skill and low-skill jobs have decreased.

In most states and territories, employment shares have also shifted towards lower levels of skills, although to a lesser extent than the shift towards high-skill jobs. The size of the increase in the employment share of low-skill jobs was substantial in Tasmania, where it increased by 1.5 percentage points. It has been argued that the decrease in middle-skill jobs, traditionally protected by collective bargaining agreements, has been associated with a weakening of unions and changes in labour law during this period. Between 1986 and 2018, union membership in Australia fell from 45.6% in 1986 to 13.7% in 2018, paralleled by a decrease in the share of workers covered by collective bargaining, which fell from 83% to 58.9% in the same period (OECD, 2019[17]).

Figure 3.10. Employment has primarily shifted towards high-skill jobs in all Australian states and territories

Job polarisation by Australian states and territories, 2006-2016



Note: Low-skill workers are those with jobs in sales and services and elementary occupations (ISCO 5 and 9). Middle-skill workers hold jobs as clerks, skilled agricultural workers, craft workers, plant and machine operators and assemblers (ISCO 4, 6, 7 and 8). High-skill workers are those who have jobs in managerial, professional, technical and associated professional occupations (ISCO 1, 2 and 3).
Source: OECD calculations on Census.

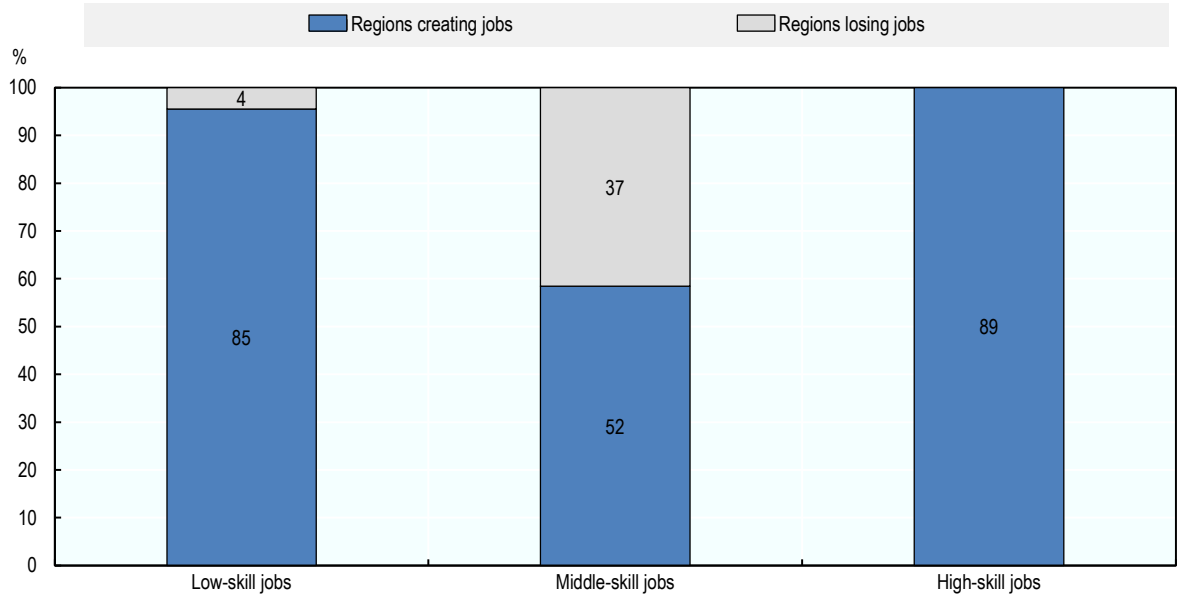
3.3.3. Local labour markets across Australia experienced different job polarisation trends

Job polarisation dynamics vary substantially at the local level in Australia. Some Australian regions have experienced increases in the employment share of middle-skill jobs over the past decade. The most prominent example is the Outback North region of Western Australia, where middle-skill jobs increased by nearly 5 percentage points between 2006 and 2016. Increases in mining activity may partly explain the increase in middle-skill jobs in the region. Employment has shifted primarily towards high-skill jobs in the large majority of regions, but there are some places where instead the shift has been towards lower levels of skills. In Southern Highlands and Shoalhaven (New South Wales), the employment share of low-skill jobs has increased by 1.7 percentage points, while the share of high-skill jobs by only 1.2 p.p. In West and North West (Tasmania), the share of low-skill jobs has increased by 2.4 p.p., compared to 1.6 for high-skill jobs.

Looking at net job creation, while the large majority of regions have created jobs in high- and low-skill occupations, many regions have also created middle-skill jobs (see Figure 3.11**)**. While this has been compensated in most cases by faster employment growth in high-skill occupations, resulting in employment share shifts towards high-skill jobs, the reliance of local employment on middle-skill jobs may create challenges in some regions, as these are the occupations most likely to be automated.

Figure 3.11. All regions have created high-skill jobs, but the majority have also created middle-skill ones

Regions creating or losing jobs by skill level, 2006 to 2016



Note: Low-skill workers are those with jobs in sales and services and elementary occupations (ISCO 5 and 9). Middle-skill workers hold jobs as clerks, skilled agricultural workers, craft workers, plant and machine operators and assemblers (ISCO 4, 6, 7 and 8). High-skill workers are those who have jobs in managerial, professional, technical and associated professional occupations (ISCO 1, 2 and 3). The numbers inside the bars indicate the number of regions.
Source: OECD calculations on Population and Housing Census.

Box 3.4. Case study areas: Sydney-South West and Warrnambool and South West

Sydney-South West

Sydney-South West experienced job polarisation over the past decade, shifting primarily towards high-skill jobs. The employment share of middle-skill jobs has decreased by about 5.3 percentage points. Jobs have primarily shifted towards higher skill level, with the employment share of high-skill jobs increasing by 4.2 percentage points**.** This suggests that local labour markets in the region require higher levels of skills among local workers.

Looking at the occupational profile of the Sydney-South West labour market over the 2006-2016 period shows that Metal, Machinery and Related Trades Workers has been the occupation shedding the largest number of jobs (-580). Other middle-skill occupations have also shed a large number of jobs in the local economy. This includes for example Stationary Plant and Machine Operators, Handicraft and Printing Workers, and General and Keyboard Clerks, shedding about 520, 340 and 260 jobs respectively. On the other hand, employment in high-skill occupations such as Teaching Professionals, Health Professionals and Business and Administration Associate Professionals has substantially increased over the same period (2 400, 2 100 and 1 800 jobs respectively). The largest net job increase has however been recorded in two low-skill occupations, Personal Care Workers and Personal Services Workers (3 000 and 2 600 jobs).

Sydney-South West has a lower share of tertiary educated population than the Australian average. About 15% of the population has a bachelor's degree and above, compared to about 24.3% in Australia. Over the past years, the share of population with non-school qualifications, including post-graduate degrees, bachelor's Degrees, diplomas and certificates among others, has increased in Sydney-South West. The increase between 2011 and 2016 has been particularly strong for non-school qualifications in society and culture (2.1 percentage points), followed by management and commerce (1.1 percentage points). On the other hand, the share of people with non-school qualifications in engineering and related technologies has decreased (-1.2 percentage points). Engineering and Related Technologies however remains the main field of study for non-school qualifications in Sydney-South West, accounting for about 15.6% of non-school qualifications.

Warrnambool and South West

Warrnambool and South West has experienced an increase in the employment shares of both high- and low-skill jobs. The employment share of middle-skill jobs has decreased by 4.4 percentage points in the region between 2006 and 2016, matched by a 2.5 percentage point increase in the share of high-skill jobs and a 1.8 percentage point increase in the share of low-skill jobs. The increase in the share of low-skill jobs is the second-highest in Victoria.

Middle-skill occupations have shed a large number of jobs in Warrnambool and South West. Specifically, Market-oriented Skilled Agricultural Workers (-700), Labourers in Mining, Construction, Manufacturing and Transport (-500), Building and Related Trades Workers (excluding Electricians) (-300) are middle-skill occupations that have shed a significant number of jobs. However, the occupation that has shed the largest number of jobs in Warrnambool and South West is Production and Specialized Services Managers, a high-skill occupation (-700 jobs). On the other hand, low-skill jobs such as Personal Care Workers and Personal Services Workers have experienced strong growth (500 jobs each), as well as high-skill jobs such as Health Professionals (400 jobs).

The share of people with non-school qualifications has increased in Warrnambool and South West between 2011 and 2016 from 51.7% to 57%. Also, in Warrnambool and South West, the increase has been strongest for non-school qualifications in society and culture (1.5 percentage points),

followed by education (0.3 percentage points). On the other hand, the relative importance of non-school qualifications in Architecture and Building, Engineering and Related Technologies, Food, Hospitality and Personal Services, as well as Information Technology has slightly decreased (-0.6, -0.5, -0.5 and -0.1 p.p. respectively). Health is the most common field of study for non-school qualifications in Warrnambool and South West, accounting for about 12.4% of non-school qualifications.

Source: OECD calculations on Population and Housing Census.

3.3.4. Polarisation has raised concerns about a shrinking middle class in Australia and across the OECD

The debate on job polarisation is part of more general public concerns around growing inequalities and a shrinking middle class across the OECD. Over the last decade, wage levels in the top of workers in the top of the skill distribution have increased substantially more than for the middle class across OECD countries. It is estimated that median incomes increased a third less than the average income of the richest 10% over the last 30 years, while the cost of important parts of the middle-class lifestyle have increased faster than median income over the last two decades (OECD, 2019[24]).

Income inequality represents a challenge to inclusiveness in both Australia as in many OECD countries. The top 20% of the income distribution in Australia lives in a household with five times as much income as the bottom 20%. In addition, people in the highest 1% live in households with an average weekly income that is 26 times the income of a person in the lowest 5% (AUD 11 682 vs AUD 436/week) (Australian Council of Social Service and University of New South Wales, 2018[25]). Income inequality in Australia has risen slightly, and is somewhat above the OECD average. However, this increase has slowed and inequality has stabilised in the last decade (OECD, 2018[10]).

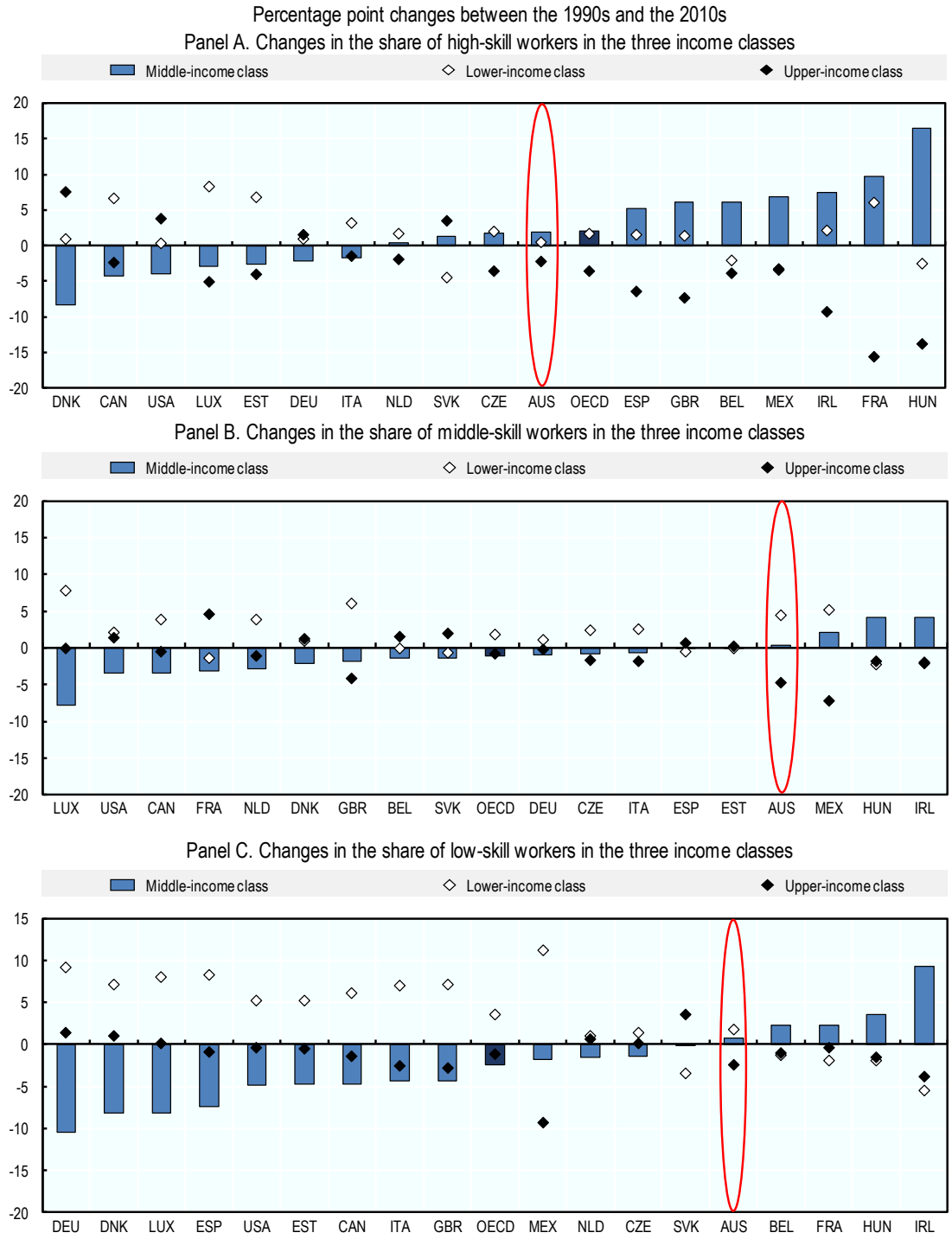
Recent research finds that changes in the occupational structure of employment in Australia can explain part of the overall increase in inequality that has occurred in the country. Changes in average earnings by occupation have also contributed to earnings inequality changes (Coelli and Borland, 2015[26]). Over the past 30–40 years, in Australia there has been a steady growth in earnings inequality for both male and female employees. Since the mid-1990s, this growth has been most pronounced at the top of the earnings distribution. Increasing earnings inequality in Australia appears to be related to changes in the occupation composition of employment; but earnings differentials between workers with different levels of education attainment have remained stable. Technological change that has allowed workers undertaking routine tasks to be replaced by machines, and institutional shifts such as the decline of trade unions, are underlying factors that seem important causes of increases in earnings inequality (Borland and Coelli, 2016[27]).

OECD estimates also show that middle-skill workers are more likely to be in lower income than before in Australia. Australia is among the OECD countries in which the share of middle-skill workers attaining upper-income class has decreased since the mid-1990s, while the share of middle-skill workers entering the low-income class has increased significantly. The OECD estimates that 4.8% less middle-skill workers comprised the upper-income class in the mid-2010s compared to the mid-1990s, while 5.1% more middle-skill workers entered the lower-income class (OECD, 2019[28]). The COVID-19 crisis is likely to accelerate such income inequality trends, harming the employment prospects of those with lower educational attainment disproportionately (Furceri et al., 2020[29]).

However, the relationship between polarisation and a shrinking middle class is more complicated than a one-to-one relationship. In general, across OECD countries, growth in high-skill occupations has outpaced growth in middle- and low-skill occupations, shifting the overall labour market distribution towards higher-skill jobs. Other factors may be more important in explaining the shrinking middle class. Notably,

the changing relationship between skills and income classes means that middle-skill workers are now more likely to be in lower-income classes than middle-income classes. The wage structure is also characterised by growing divides between top earners and everyone else, rather than growth in jobs at both ends of the wage scale (i.e. polarisation) (OECD, 2019[28]).

Figure 3.12. The relationship between skills and income has loosened across the OECD



Source: OECD (2019[28]).

3.4. Job polarisation has gone hand in hand with skills upgrading

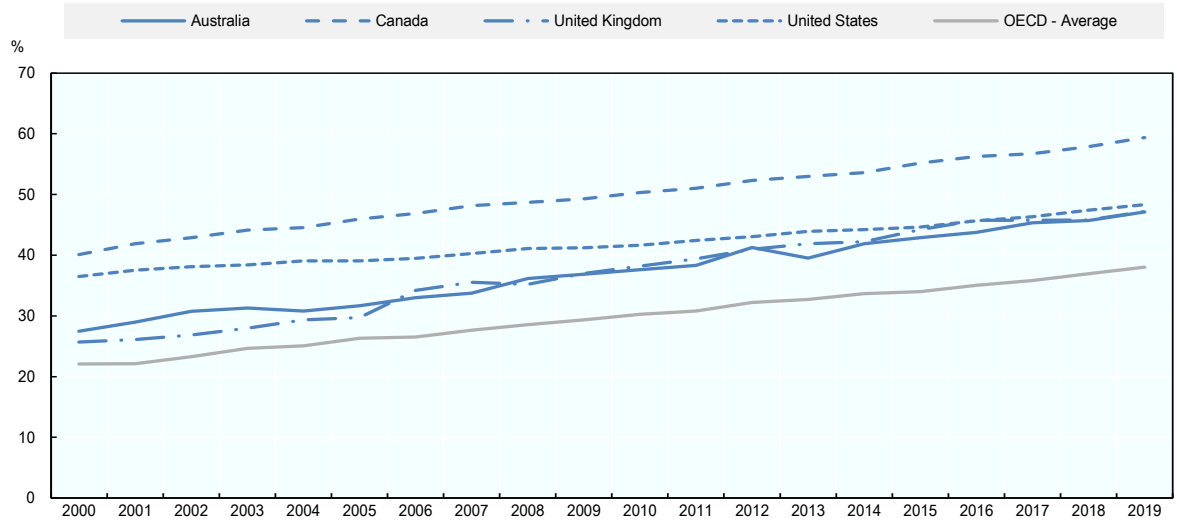
3.4.1. Australia attains higher levels of education than on average in the OECD

In addition to digitalisation and automation, polarisation has often been linked to changes in the labour supply, or the type of skills available in the labour force. In particular, the rising educational attainment of the population may have contributed to job creation at the upper end of the skills distribution. Indeed, when the educational attainment of the workforce rises, employers have an incentive to shape production processes around higher-skill jobs (Murphy and Oesch, 2017[30]).

Tertiary education attainment has increased in Australia as across the OECD over the past decades. About 27.5% of 25-64 year-olds attained tertiary education in Australia in 2000, while today more than 45.7% do so. The share of tertiary educated adults in Australia has been consistently above the OECD average. However, it lags behind some top performers across the OECD, including for instance Canada. About one in three tertiary graduates in Australia graduated in Business as their field of study. Health is the second most often picked field of study.

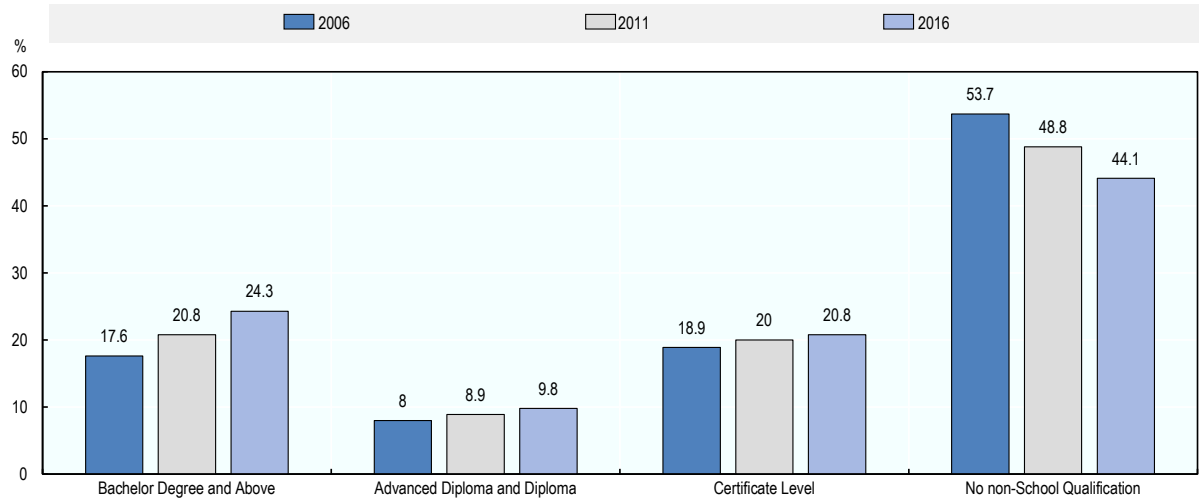
In general, more Australians attain non-school qualifications, including bachelor's degrees and above, Advanced Diplomas and Certificates. The share of the population with a bachelor's degree and above as their highest qualification level has increased from 17.6% to 24.3% between 2006 and 2016. More people achieve Advanced Diploma and Diploma, as well as Certificate Level, while the share of those with no non-school qualifications has fallen. In addition, the share of Australians with higher levels of education is likely to increase over the coming years, as enrolment rates in tertiary education have continued to rise.

Figure 3.13. Share of adults, 25 to 64 years old, with a tertiary education in Australia is higher than the OECD average



Source: OECD (2021[31])

Figure 3.14. The share of Australians with a bachelor's degree, advanced diploma or certificate has increased over the past decade



Note: Bachelor degree and above includes bachelor degrees, graduate certificates and graduate diplomas and postgraduate degrees.
Source: Australia Census of Population and Housing

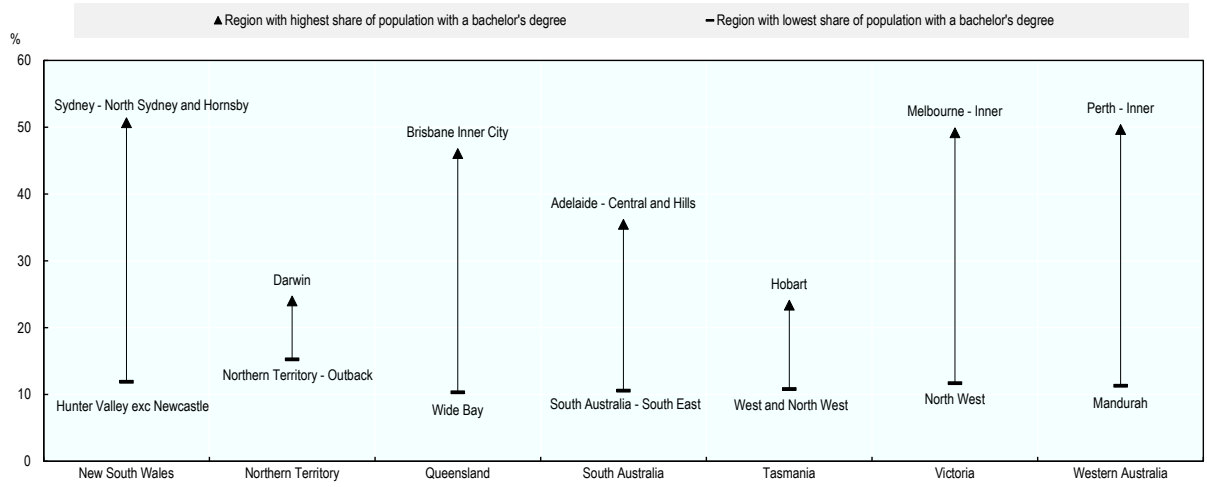
3.4.2. ..but educational attainment varies substantially across regions

While the share of people undertaking non-school education has increased across Australia, the picture is rather uneven across states and territories. For example, in the Australian Capital Territory, 60.6% of the population aged 15+ (about 195 000 people) has non-school qualifications, with the majority of them having a bachelor's degree (72 000 people). On the other hand, only 44.7% of the population residing in Northern Territory (about 80 000 people) has non-school qualifications, with less than 13 000 people having a bachelor's degree.

Regional differences are even more pronounced when looking within states and territories (see Figure 3.15). In New South Wales for instance, where about 16% of the population (977 000 people) have a Bachelor Degree, the share of the population with a Bachelor Degree ranges from 50.7% in Sydney-North Sydney and Hornsby (about 156 000 people) to 11.9% in Hunter Valley exc. Newcastle (22 000 people). Similarly, in Victoria, where 16.5% of the population has a bachelor's degree (798 000 people), the share varies substantially at the regional level. About 49.1% of the population (230 000 people) has a bachelor's degree in Melbourne – Inner, while only 11.7% in North West (12 000 people).

Figure 3.15. The share of population with bachelor's degree and above varies widely within states and territories

Share of population with a bachelor degree and above, regions within state and territories with the highest and lowest shares, 2016



Source: Australian Bureau of Statistics. 2071.0 Census of Population and Housing: Reflecting Australia - Stories from the Census, 2016 - Educational Qualifications.

3.4.3. High-skill workers and jobs tend to be geographically concentrated

Differences in the qualifications of the local labour force reflect disparities in the availability of labour market opportunities at the local level. Highly qualified people were more likely to be employed in professional occupations across Australia. The most common occupations in 2016 for people with a bachelor's degree or above were Registered nurses and Primary and Secondary school teachers. Men with a bachelor's degree or above were more likely to be Accountants (56 000) or Software applications programmers (51 600), whereas women were more likely to be Registered nurses (141 700) or Primary school teachers (111 700). For those with other non-school qualifications, the most common occupations were Sales assistants, Electricians and Child carers. Men with other qualifications were more likely to be Electricians (90 700) or Carpenters and joiners (73 200), whereas women were more likely to be Child carers (75 900) or Sales assistants (67 800) (Australian Bureau of Statistics, 2017[32]). Regions where the share of population with a bachelor's degree and above is higher also tend to have shifted more towards high-skill jobs.

3.5. The future of work requires action on both the skills supply and demand in Australia

Investments today in lifelong learning and vocational training can ensure workers are ready for the upturn, while also supporting regions to make transitions to new economic opportunities. During the 2008 Global Financial Crisis (GFC), investments mainly targeted individuals to acquire skills in new and emerging sectors. However, such efforts were sometimes undermined by low firm demand and sub-optimal use of those skills in the workplace. Flexible forms of skills development can be instrumental in responding to the accelerated reallocation of labour in local economies, including greater access to e-learning opportunities that focus on the needs of workers, especially disadvantaged ones while working

with firms to promote workforce innovation and better human resources management practices. This tailoring and proximity to firms and workers will be an essential asset for the recovery (OECD, 2020[33]).

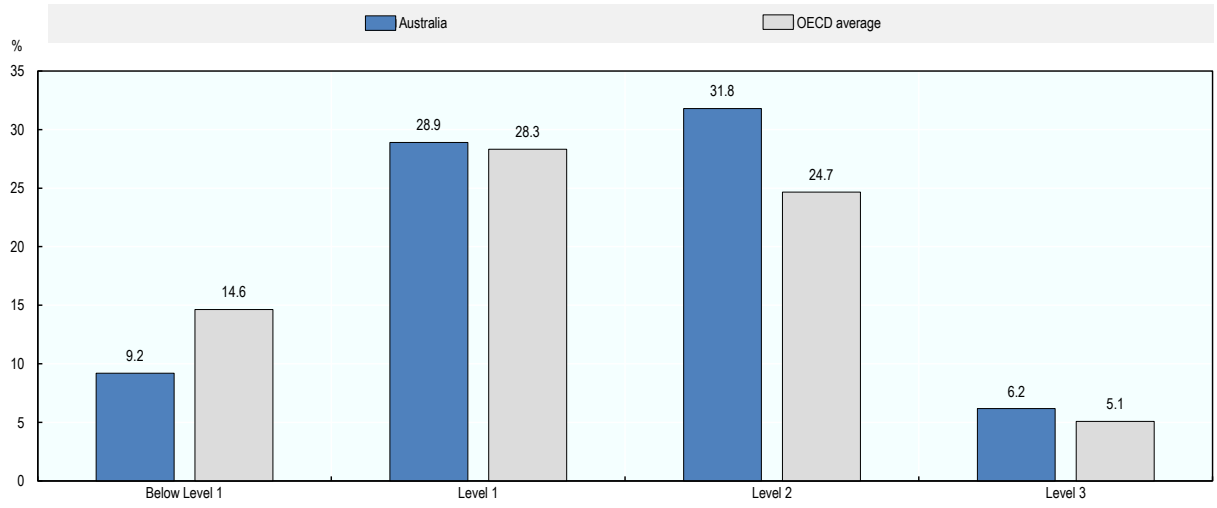
3.5.1. Digital skills will be crucial to succeed in a post-pandemic world

COVID-19 has highlighted the importance of digital skills in the labour market. The crisis has accelerated the adoption of digitalisation in the workplace, to help reduce avoidable physical interactions. This has meant finding ways to reinvent work and, in some cases, a partial disruption of jobs and changes in the way workers perform them (McKinsey & Company, 2020[34]). Developing the appropriate digital skills in the workforce is an important component in Australia's effort to compete in this rapidly emerging global digital economy.

Australian adults have a strong set of digital skills, compared to the OECD average, according to the OECD's Survey of Adult Skills (PIAAC) (see Figure 3.16). Australian adults have above average proficiency in problem-solving in technology-rich environments, with about 40% scoring in the top two levels, compared to about 30% on average across the OECD (OECD, 2018[35]). In addition, Australia has a lower share of adults with low ICT skills and information-processing skills than the OECD average (7.5% and 1.7% of adults in Australia, compared to 16.3% and 3.0% across the OECD).

Figure 3.16. Australian adults perform better than across the OECD in problem-solving in a technology-rich environment

Results from the OECD Programme for the International Assessment of Adult Competences (PIAAC)



Source: OECD (2019[36])

The demand for digital skills has a local dimension in Australia. Burning Glass (BG) data shows that within Australia there is a substantial difference at the local level in the demand for digital skills, which emerges from advertisements of jobs requiring digital skills. For example, jobs advertisement linked to ICT specialist jobs are heavily concentrated, within New South Wales, and specifically Sydney, being the city where more than 40% of total jobs are advertised. In addition, ICT job openings are concentrated predominantly in urban areas in Australia, more so than in some other OECD countries according to Burning Glass data. The degree to which digitalisation is occurring in Australian workplaces is highly variable, as are the approaches of employers in meeting their digital skill requirements. The National Centre for Vocational Education Research (NCVER) identifies three different categories of employers, based on their approaches to technology uptake and skills acquisition: aggressive technology adoption

and skills-development approach; keen technology adoption but cautious skills-development approach; appreciation of growing need for digital skills, but no investment in skills development (NCVER, 2020[37]).

In addition to basic digital proficiency, it will be crucial for Australians to develop know-how of specific digital applications. A recent survey conducted by the NCVER shows that the top five technologies with the greatest impact on skill requirements across Australian industries are mobile, cloud, automation, big data and the internet of things. The increasing digitalisation of work through the application of mobile and smart devices, robotics, enterprise systems, cloud computing and augmented and virtual reality will continue to significantly affect working methods and practices and the types of skills required to succeed in future workplaces. The majority of survey respondents indicated that their need for ICT professionals, which are mostly high-skilled and well-paying jobs, has increased over the past five years, with the required skills becoming more difficult to find. On the other hand, because of the adoption of digital technologies, some employers are having an easier time than previously in meeting their digital skill requirements (NCVER, 2020[37]).

Box 3.5. The importance of "hybrid skills": evidence from Canada

While digital skills are in need across the OECD, this is not in isolation. Looking at the Canadian labour market, the Brookfield Institute for Innovation + Entrepreneurship (BII+E), a Canadian think tank, has identified some trends, whereby employers are seeking digital and non-digital skills in combination, i.e. "hybrid jobs". Despite a growing narrative around the importance of learning to code, for most Canadians, foundational digital skills alongside a suite of non-digital skills — in particular, interpersonal skills — are critical foundations to be competitive in the labour market. General workforce digital skills, while less digitally-intensive, show up in roughly one third of all job postings in Canada. This includes the baseline digital skills that most Canadian workers need, the most predominant of which are those found in the Microsoft Office Suite. It also includes occupation-specific software, such as business intelligence software and SAS. The most common skills appearing alongside workforce digital skills are communication and organisational skills. Other soft skills likely to appear alongside workforce digital skills include interpersonal skills, such as 'teamwork', 'collaboration', and 'customer service'; project management skills, such as 'budgeting' and 'planning'; and more general skills and aptitudes, such as 'problem-solving' and 'detail-orientedness'.

For highly technical workers, digital skills are necessary, but they should be complemented by non-digital skills. Roles requiring a high proportion of skills from the Software/Product Development and Systems Infrastructure skills clusters are not only the most digitally-intensive, but also the most hybrid. This means that in addition to digital skills, employers look for non-digital skills from different domains at a higher intensity compared to other roles. For these highly-digital roles, employers are looking for particularly dynamic candidates, with technical domain knowledge augmented by many non-digital skills; in particular, those that pertain to communications, teamwork, problem solving, and project management, reflecting the creative and collaborative nature of these roles. For current and prospective workers in these fields, strong digital skills are necessary, but insufficient. It is perhaps just as critical to enhance one's interpersonal, creative, and problem-solving skills and abilities.

Source: OECD (2020[38]); Vu, Willoughby and Lamb (2019[39]).

The future of work requires workers to develop a broad mix of skills, including digital skills but also strong basic, cognitive and socio-emotional skills, to succeed in the workplace. The digital revolution makes the same kind of skills mix necessary in all walks of life. Without basic skills, workers are

locked out of the benefits the Internet can offer, or limited to its most elementary uses. Recent work by the Brookfield Institute for Innovation + Entrepreneurship in Canada highlights the importance of "hybrid skills" in the workplace (see Box 3.5). Policies need to offer everyone ways to get the most out of new technologies. This is particularly true for regions that are already lagging behind (OECD, 2019[40]).

3.5.2. Australians have good foundational skills, but there are differences based on socio-economic characteristics

Australia outperforms the OECD average in adult literacy and numeracy proficiency. Data from the OECD Programme for the International Assessment of Adult Competences (PIAAC) shows that the mean literacy score for Australian adults is 280.4, compared to the average across the OECD of 266.2. Australia's score in literacy is the fourth highest across all OECD countries. Similarly, Australian adults score on average 267.6 in numeracy, compared to 261.9 (OECD, 2019[36]).

There are however differences among segments of the population in terms of basic proficiency, and these are sometimes more accentuated than the OECD average. For example, when looking at literacy proficiency, differences are particularly accentuated by education, occupation and immigrant background. Tertiary educated adults perform better than those with less than upper secondary education, skilled workers outperform those in elementary occupations, and native born/native language adults score better than foreign born/foreign language ones (OECD, 2013[41]).

One in five Australians – around three million adults – have low literacy and/or numeracy skills, according to the PIAAC Survey. For the purposes of this report, adults with low literacy or numeracy skills are not able to reach Level 2 proficiency in literacy or numeracy on a scale that goes up to Level 5. Australia has a similar share of adults with low literacy and/or numeracy skills as New Zealand. It has a smaller proportion of adults with low skills than the United States, the United Kingdom (England and Northern Ireland) and most European Mediterranean countries but a larger share than Nordic countries, Japan, and the Netherlands (OECD, 2017[42]). Adults lacking the basic foundational skills and might face more hardship in switching jobs or transition to new opportunities in light of COVID-19.

3.5.3. Adult training participation is uneven across segments of the population

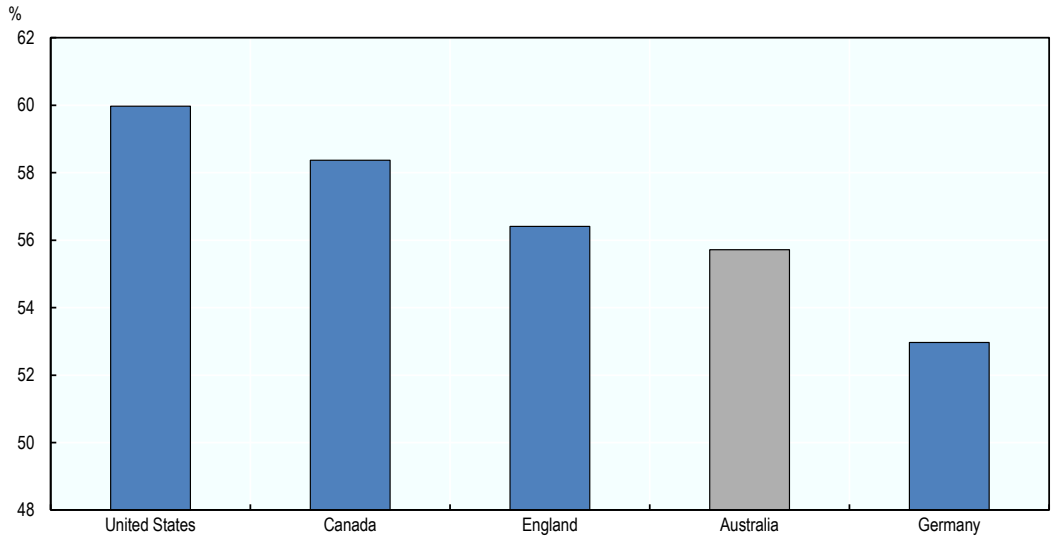
Adults in Australia, including those with low skills, are more likely to continue in education and training after leaving formal education than their peers in other countries. However, fewer Australian adults participate in training compared to some top performing OECD countries. About 55.7% of adults participate in training in Australia, lower than in the United States (60%), Canada (58.4%) and England (56.4%). However, Australia performs better than Germany (53%) (see Figure 3.17). Among the reasons for not participating in training, most Australians cite being too busy at work (26.9% of Australians not participating in training). Not having the time and being enrolled in education are the following most cited reasons (21% and 18.4%) (see Figure 3.18). The reasons for not participating in training differ slightly among men and women. About 30% of women who do not participate in training cite the lack of time as the reason, while this is an issue for only 10% of men not participating in training. On the other hand, 37% of men claim that they were too busy at work to participate in training, compared to less than 20% for women.

There are differences in adult training participation in Australia based on a number of socio-economic characteristics (see Figure 3.19). For example, age: adults aged 25-54 are more likely to participate in training than those aged 15-24 and 55+ (59.4%, 58.3% and 40.6% respectively). This is intuitive, as most adults receive training at work, and younger adults are likely to be in school, while older people are likely to be retired. However, this also points to potential challenges, especially for older adults, who might risk losing their job to automation or in light of the COVID-19 pandemic, and are less likely to participate in training. Adults working in micro and small enterprises are less likely to participate in training

than those working in medium-sized firms (56.1%, 64.4% and 75.4% respectively), although those least likely to participate in training are adults working in large firms (45.9%). Finally, educational attainment is also a key variable influencing adult training participation. Those with less than high-school education are about half as likely to participate in training than adults with above than high-school education (36.1% and 74.4% respectively). About one in two Australian adults with a high-school degree participates in training. Part of this difference can be explained by the job characteristics of low-skilled individuals. For example, low-skilled adults are typically in jobs that provide fewer training opportunities (Grotlüschen et al., 2016[43]).

Figure 3.17. Australia is behind the United States, Canada and England in adult training participation

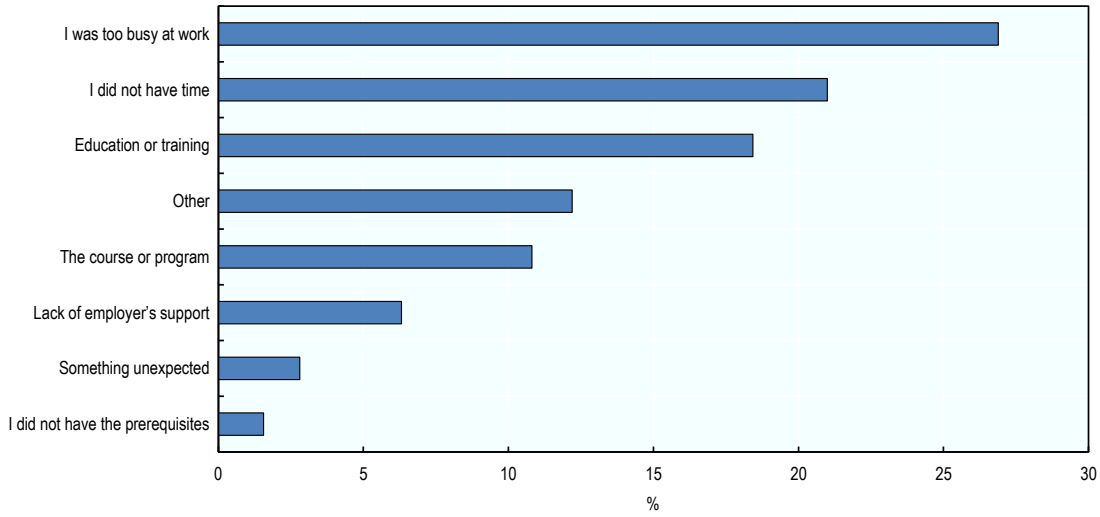
Share of 25-64 year-olds participating in training



Source: OECD calculations on PIAAC (2012, 2015, 2018)

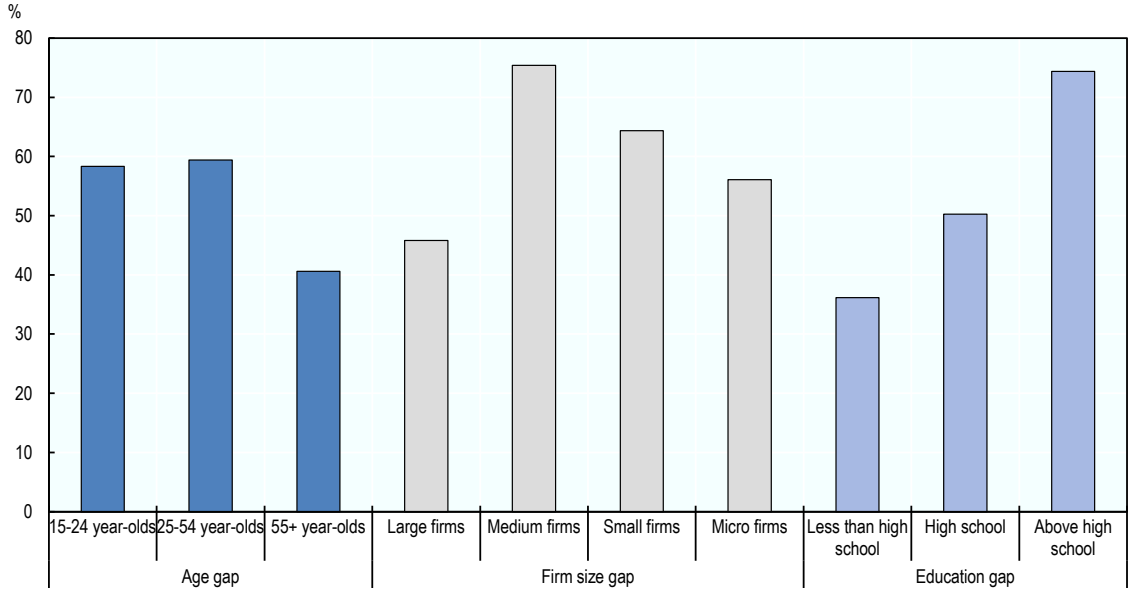
Figure 3.18. Most Australians who did not participate in training were too busy at work

Reasons for not participating in training



Source: OECD calculations on PIAAC (2012).

Figure 3.19. There are a number of gaps in training participation across Australia



Note: Micro: less than 10 workers; small: 10-49 workers; medium: 50-249 workers; large: 250+ workers.
Source: OECD calculations on PIAAC (2012).

3.5.4. COVID-19 has made investment in skills development more important than ever

Closing gaps in access to training is particularly important, given the uneven impacts of COVID-19 across the skills spectrum. Low-skill, low-wage, and young people may be the most vulnerable to job losses. These same groups are also more likely to hold jobs at higher risk of automation, a process that firms may accelerate in light of the pandemic. Going forward, it will be crucial to ensure that these categories of workers can access skills development opportunities to prepare for the upturn and transition into new jobs (OECD, 2020[33]).

The COVID-19 crisis proved an important testing ground for online training and career guidance, as in-person services were not available (OECD, 2020[44]). Equity has emerged as an important concern, as low-skilled or low-wage workers who did not have sufficient digital skills or access to adequate internet connection could not take advantage of these opportunities. Going forward, training should be aligned with the results of skill assessment and anticipation exercises. Career guidance counsellors can be instrumental in directing adults towards skills in demand. Skills profiling tools and programmes could help ensure that training is efficiently focused on the jobseeker's skill gaps. Australia's Department for Education, Skills and Employment is encouraging workers affected by COVID-19 to consult its Skills Match online tool. The tool helps users to identify the skills they already have based on their previous work experience. It then presents new job ideas that use similar transferable skills (OECD, 2020[45]).

Box 3.6. Australia's Skills Match online tool

Skills Match is an online, interactive tool available on the Australian Government's Job Outlook website to help workers and job seekers match their current skills and experience to new jobs. The tool is open to people of any age and stage in their working life, including workers looking for a promotion or a new job, those looking for work facing retrenchment, and those looking to develop new skills. Through the website, users can discover the key skills they may have developed throughout their career, ideas for careers they can transfer into, and the new skills needed to step into an alternative career. The tool also provides suggestions of training pathways that could help make the leap. It then presents new job ideas that use similar transferable skills. For instance, the tool suggests that workers affected by closures in accommodation and food services may have the necessary skills to transition into currently in-demand jobs like cashiers, cleaners, pharmacy sales assistants, aged and disabled care workers, and nursing support workers.

While the Skills Match tool was launched in mid-2019, it was advertised in the context of the COVID-19 pandemic in 2020. The website emphasises that for workers who have lost their job due to COVID-19, it is important to understand the skills they have gained in past jobs and how this experience equips them to work in a range of different jobs they may not have previously considered, but might be in demand. As an example, Skills Match shows that people employed in the five largest employing jobs (i.e. Waiter, Kitchenhand, Bar Attendants and Baristas, Chefs and Sales Assistants) in the Accommodation and Food Services industry may have the skills to transition into jobs likely to be in demand, including:

- checkout operators and office cashiers
- pharmacy sales assistants
- hospital orderlies, nursing support workers
- aged and disabled carers, personal care assistants, welfare workers
- shelf fillers
- commercial cleaners
- food and drink factory workers
- storepersons
- truck drivers and couriers
- packers
- call or contact centre operators
- security officers and guards

Source: Australian Government Department of Education, Skills and Employment (2019[46]; 2020[47]); OECD (2020[45]).

3.5.5. Skill use at work is strong in Australia, but there is an opportunity to further promote high-performance work practices (HPWPs)

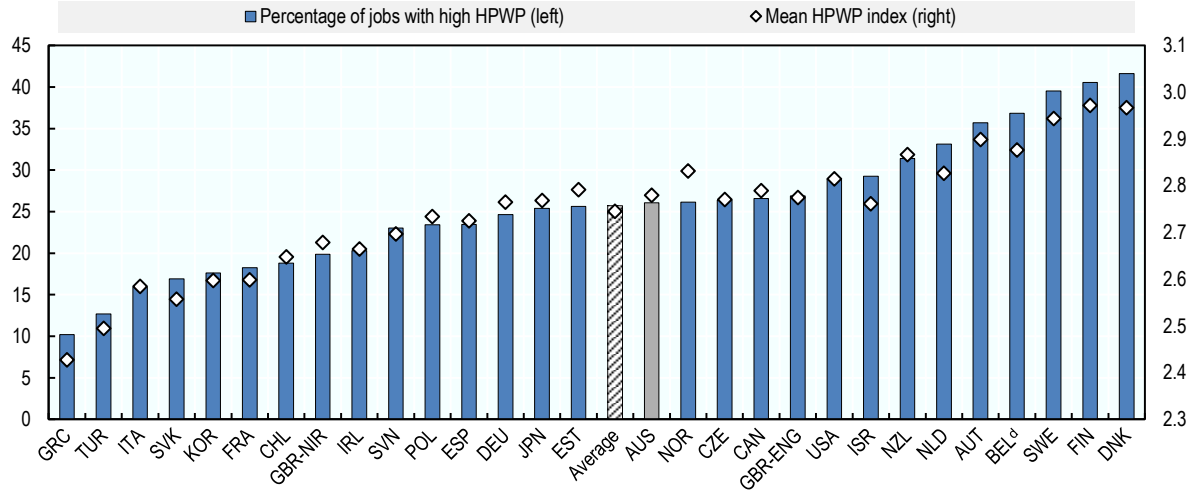
Across the OECD, policy makers have often emphasised the importance of boosting the supply of skills, with a focus on the number of people with vocational or academic qualifications. Less policy attention has been devoted to the use of skills in the workforce and the alignment between the competences of workers with the needs of the business. Having a workforce with the right skills is not sufficient to achieve economic growth and boost productivity. For economies to grow and individuals to succeed in the labour market, skills need to be put to productive use at work (OECD, 2016[48]). Promoting

the increased use of skills can help employers move towards higher value-added employment and improve business performance. More productive jobs tend to be of higher quality and have higher wages, thereby improving social and economic outcomes at the local level (OECD/ILO, 2017[49]).

Australia is already among the top performers across the OECD when it comes to skills use in the workplace. Australia scores above the OECD average in the use of information-processing skills in the workplace, including reading, writing, numeracy, ICT and problem-solving. Specifically, it ranks first among all OECD countries in the use of problem-solving skills in the workplace.

Promoting the emergence of high-performance work practices could be a further opportunity for Australia to put skills to good use. The term "high performance work practices" (HPWPs) refers to a set of human resources practices that are associated with greater skills use and informal learning. HPWPs include aspects of work organisation and job design (such as teamwork, autonomy, task discretion, mentoring, job rotation, applying new learning), as well as management practices (such as employee participation, incentive pay, training practices and flexibility in working hours). OECD work shows that the share of jobs with HPWPs in Australia is around the OECD average, lagging behind top performers such as Denmark, Finland and Sweden (see Figure 3.20). The share of jobs with high work organisation HPWP is lower in Australia than on average in the OECD. Looking specifically at management practices, Australia is among the top OECD countries in the share of jobs providing flexible working hours, while only very few employees receive bonuses (OECD, 2016[50]).

Figure 3.20. Australia performs around the OECD average in the use of High Performance Work Practices (HPWPs)



Note: a) Share of workers in jobs where the summary HPWP is above the top 25th percentile of the pooled distribution; b) Average value, across jobs, of the HPWP index. The HPWP index is a sum scale of the following subcomponents: problem solving, ICT at work, numeracy, writing, and reading.
Source: OECD (2016[50])

References

Adalet McGowan, M. and D. Andrews (2015), "Labour Market Mismatch and Labour Productivity: Evidence from PIAAC Data", *OECD Economics Department Working Papers*, No. 1209, OECD Publishing, Paris, https://dx.doi.org/10.1787/5js1pzx1r2kb-en. [8]

Austin, J. and B. Hershbein (2020), *In many communities, COVID-19 will permanently kill jobs. Here's how they can respond.*, https://www.brookings.edu/blog/the-avenue/2020/09/17/in-many-communities-covid-19-will-permanently-kill-jobs-heres-how-they-can-respond/. [2]

Australian Bureau of Statistics (2021), *Job Vacancies, Australia*, https://lmip.gov.au/default.aspx?LMIP/GainInsights/VacancyReport. [1]

Australian Bureau of Statistics (2017), *2016 Census Data Summary: Educational Qualifications in Australia*, https://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/812889320AC5D259CA2581BE0015619B/$File/educational%20qualifications,%202016%20census%20data%20summary.pdf (accessed on 9 September 2020). [32]

Australian Council of Social Service and University of New South Wales (2018), *Inequality in Australia 2018*. [25]

Australian Government Department of Education, Skills and Employment (2020), *How to identify your skills and transition to jobs in demand*, https://www.employment.gov.au/newsroom/how-identify-your-skills-and-transition-jobs-demand. [47]

Australian Government Department of Education, Skills and Employment (2019), *New tool to help workers pave the way to their next career move*, https://www.employment.gov.au/newsroom/new-tool-help-workers-pave-way-their-next-career-move. [46]

Australian Government Department of Employment, Skills, Small and Family Business (2019), *Ratings Summary - Labour Market Analysis of Skilled Occupations*, https://docs.employment.gov.au/system/files/doc/other/ratingssummary_june2019_0.pdf (accessed on 10 September 2020). [55]

Australian Government Department of Jobs and Small Business (2018), *Automotive Trades: Australia 2018*, https://docs.employment.gov.au/system/files/doc/other/automotivetradesaus_2.pdf (accessed on 14 September 2020). [53]

Australian Industry and Skills Committee (2020), *Automotive | National Industry Insights Report*, https://nationalindustryinsights.aisc.net.au/industries/automotive (accessed on 14 September 2020). [52]

Autor, D. and D. Dorn (2009), *The growth of low skilled service jobs and the polarization of the US labour market, National Bureau of Economic Research Working Paper 15150*, https://www.nber.org/papers/w15150.pdf. [13]

Autor, D., F. Levy and R. Murnane (2001), *The skill content of recent technological change: an empirical explanation*, https://www-nber-org.acces-distant.sciencespo.fr/papers/w8337.pdf. [19]

Borland, J. and M. Coelli (2016), "Labour Market Inequality in Australia", *Economic Record*, Vol. 92/299, pp. 517-547, http://dx.doi.org/10.1111/1475-4932.12285. [27]

Coelli, M. and J. Borland (2015), *Job polarisation and earnings inequality in Australia **, https://fbe.unimelb.edu.au/__data/assets/pdf_file/0009/1427409/1192CoelliBorland.pdf (accessed on 9 July 2020). [26]

Eurofound (2015), *Upgrading or polarisation? Long-term and global shifts in the employment struture: European Jobs Monitor 2015, Publications Office of the European Union, Luxembourg*. [14]

Fernández-Macías, E. (2012), "Job Polarization in Europe? Changes in the Employment Structure and Job Quality, 1995-2007", *Work and Occupations*, Vol. 39/2, pp. 157-182, https://doi.org/10.1177%2F0730888411427078. [15]

Furceri, D. et al. (2020), *COVID-19 will raise inequality if past pandemics are a guide*, https://voxeu.org/article/covid-19-will-raise-inequality-if-past-pandemics-are-guide. [29]

Goos, M. and A. Manning (2007), "Lousy and lovely jobs: the rising polarization of work in Britain", *The Review of Economics and Statistics*, Vol. 89/1, pp. 118-133. [12]

Goos, M., A. Manning and A. Salomons (2009), "Job Polarization in Europe", *American Economic Review*, Vol. 99/2, pp. 58-63, http://dx.doi.org/10.1257/aer.99.2.58. [16]

Grotlüschen, A. et al. (2016), "Adults with Low Proficiency in Literacy or Numeracy", *OECD Education Working Papers*, No. 131, OECD Publishing, Paris, https://dx.doi.org/10.1787/5jm0v44bnmnx-en. [43]

ILO (2012), *Structure of the International Standard Classification of Occupations*, http://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm. [23]

ManpowerGroup (2018), *2018 Talent Shortage - Solving the Talent Shortage: Build, Buy, Borrow and Bridge*, https://manpowergroup.ca/campaigns/manpowergroup/talent-shortage/pdf/canada-english-talent-shortage-report.pdf (accessed on 1 August 2019). [51]

ManpowerGroup (2018), *2018 Talent Shortage Survey: Solving the Talent Shortage: Build, Buy, Borrow and Bridge: Australia*, https://downloads.manpowergroup.com.au/hubfs/MPG_TalentShortageSurvey_Files/assets/MG_TalentShortage2018_AU_2.pdf?hsCtaTracking=11777e93-0fb1-478c-bbdf-a51e36af6f80%7C55a7b462-44be-4b6e-8c3f-1076b8f4e78f (accessed on 10 September 2020). [5]

McKinsey & Company (2020), *To emerge stronger from the COVID-19 crisis, companies should start reskilling their workforces now*, https://www.mckinsey.com/business-functions/organization/our-insights/to-emerge-stronger-from-the-covid-19-crisis-companies-should-start-reskilling-their-workforces-now (accessed on 13 May 2020). [34]

Montt, G. (2015), "The causes and consequences of field-of-study mismatch: An analysis using PIAAC", *OECD Social, Employment and Migration Working Papers*, No. 167, OECD Publishing, Paris, https://dx.doi.org/10.1787/5jrxm4dhv9r2-en. [7]

Muro, M., J. Whiton and R. Maxim (2019), *What jobs are affected by AI? Better-paid, better-educated workers face the most exposure*, https://www.brookings.edu/research/what-jobs-are-affected-by-ai-better-paid-better-educated-workers-face-the-most-exposure/ (accessed on 9 July 2020). [20]

Murphy, E. and D. Oesch (2017), "Is Employment Polarisation Inevitable? Occupational Change in Ireland and Switzerland, 1970-2010", *Work, Employment and Society*, Vol. 32/6, pp. 1099-1117, https://doi.org/10.1177%2F0950017017738944. [30]

National Skills Commission (2020), *Vacancy Report August 2020*, https://jkpersonnel.com.au/content/uploads/2020/09/Vacancy-Report-August-2020.pdf. [3]

NCVER (2020), *Skilling the Australian workforce for the digital economy*, https://www.ncver.edu.au/__data/assets/pdf_file/0026/5744123/Skilling-the-Australian-workforce-for-the-digital-economy.pdf. [37]

OECD (2021), *Adult education level* (indicator), https://dx.doi.org/10.1787/36bce3fe-en (accessed on 6 September 2021). [31]

OECD (2021), *OECD Regional Outlook 2021: Addressing COVID-19 and Moving to Net Zero Greenhouse Gas Emissions*, OECD Publishing, Paris, https://dx.doi.org/10.1787/17017efe-en. [4]

OECD (2020), *From pandemic to recovery: Local employment and economic development*, https://read.oecd-ilibrary.org/view/?ref=130_130810-m60ml0s4wf&title=From-pandemic-to-recovery-Local-employment-and-economic-development (accessed on 12 May 2020). [33]

OECD (2020), *Job Creation and Local Economic Development 2020: From pandemic to recovery, OECD Publishing, Paris*, http://dx.doi.org/Unpublished. [18]

OECD (2020), *Preparing for the Future of Work in Canada*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, https://dx.doi.org/10.1787/05c1b185-en. [38]

OECD (2020), *Skill measures to mobilise the workforce during the COVID-19 crisis*, OECD Publishing, https://www.oecd.org/coronavirus/policy-responses/skill-measures-to-mobilise-the-workforce-during-the-covid-19-crisis-afd33a65/. [45]

OECD (2020), *The potential of online learning for adults: Early lessons from the COVID-19 crisis*, OECD Publishing, https://www.oecd.org/coronavirus/en/policy-responses. [44]

OECD (2019), *Employment Outlook 2019, OECD Publishing, Paris*, https://doi.org/10.1787/9ee00155-en. [17]

OECD (2019), *OECD Skills Outlook 2019 : Thriving in a Digital World*, OECD Publishing, Paris, https://dx.doi.org/10.1787/df80bc12-en. [40]

OECD (2019), *Skills Matter: Additional Results from the Survey of Adult Skills*, OECD Skills Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/1f029d8f-en. [36]

OECD (2019), *Under Pressure: The Squeezed Middle Class*, OECD Publishing, Paris, https://dx.doi.org/10.1787/689afed1-en. [28]

OECD (2019), *Under Pressure: The Squeezed Middle Class*, OECD Publishing, Paris, https://dx.doi.org/10.1787/689afed1-en. [24]

OECD (2018), *Getting Skills Right: Australia*, Getting Skills Right, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264303539-en. [35]

OECD (2018), *Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264308817-en. [9]

OECD (2018), *Job Creation and Local Economic Development 2018: Preparing for the Future of Work*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264305342-en. [22]

OECD (2018), *OECD Economic Surveys: Australia 2018*, OECD Publishing, Paris, https://dx.doi.org/10.1787/eco_surveys-aus-2018-en. [10]

OECD (2017), *Building Skills for All in Australia: Policy Insights from the Survey of Adult Skills*, OECD Skills Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264281110-en. [42]

OECD (2017), *Getting Skills Right: Skills for Jobs Indicators*, Getting Skills Right, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264277878-en. [6]

OECD (2017), *OECD Employment Outlook 2017*, OECD Publishing, Paris, https://dx.doi.org/10.1787/empl_outlook-2017-en. [11]

OECD (2017), *OECD Science, Technology and Industry Scoreboard 2017: The digital transformation*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264268821-en. [54]

OECD (2016), *OECD Employment Outlook 2016*, OECD Publishing, Paris, https://dx.doi.org/10.1787/empl_outlook-2016-en. [50]

OECD (2016), *Skills Matter: Further Results from the Survey of Adult Skills*, OECD Skills Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264258051-en. [48]

OECD (2015), *In It Together: Why Less Inequality Benefits All*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264235120-en. [21]

OECD (2013), *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264204256-en. [41]

OECD/ILO (2017), *Better Use of Skills in the Workplace: Why It Matters for Productivity and Local Jobs*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264281394-en. [49]

Vu, V., R. Willoughby and C. Lamb (2019), *I, Human: Digital and soft skills in a new economy*, http://www.burning-glass.com/ (accessed on 24 January 2020). [39]

4. Future-proofing people, places and firms in Australia

Challenges associated with COVID-19 and the future of work will diverge by place depending on the profile of the local labour market. This chapter outlines policies and programmes being undertaken in Australia to prepare people, places and firms for the future of work. It highlights local examples as well as international practices from other OECD countries.

In Brief

Australia is taking action to future-proof people, places and firms

- **COVID-19 is impacting communities differently across Australia**. In response, the Australian Government has taken immediate action to support workers and firms during the pandemic. Beyond national measures, state and territory governments have also introduced support measures to complement those introduced by the Australian Government.
- **The pandemic is accelerating ongoing trends in the labour market, such as the adoption of automation and new technologies**. Investment in automation typically comes with uncertainty, and firms may lack the resources to undertake it in times of economic downturn. However, experience from previous recessions shows that economic crises also represent an opportunity to boost automation, as firms may substitute low-skill workers with a mix of high-skill workers and new technologies. In addition, the hygiene and social distancing measures linked to COVID-19 may contribute to make the case for further automation in the workplace. COVID-19 could transform many of the ongoing economic, demographic, and environmental shifts into abrupt changes, making the transition even more difficult for some people and places. The pandemic could also reorient trends such as urbanisation and globalisation, opening up new opportunities for places lagging behind.
- **Prior to the pandemic, both the Australian Government and state/territory governments had started to take action to future-proof communities, and policies and programmes to help people transition into the future work have become even more relevant in light of COVID-19**. Public employment services are under reform to become more responsive to the future of work and programmes to deliver skills for today and tomorrow are being introduced across Australia. Targeted programmes, such as the Regional Employment Trials and the Local Jobs Program, have also been established to support disadvantaged regions. In addition, some initiatives at the local level are emerging as opportunities to create jobs in the long term, such as the New Sydney Airport in Western Sydney.
- **SMEs often struggle more than larger companies in accessing the skills they need and developing their workforce talent**. As SMEs account for substantial shares of employment across Australia, targeted strategies to ensure SMEs invest in preparing their workforce for future changes in the labour market are needed.

Introduction

The Australian Government has taken decisive action to support family and workers during the pandemic. It has also prioritised skills development to support job transitions, for example by establishing the National Skills Commission (NSC). This chapter outlines recent trends and actions to prepare people, places and firms for the future of work in Australia. Section 4.1 presents recent developments on the impacts of COVID-19 and the future of work in Australia. Sections 4.2 and 4.3 outline initiatives being undertaken by the Australian Government as well as state/territory governments to prepare people and places for the future of work. Section 4.4 delves into the specific needs of, and targeted initiatives in support of, SMEs.

4.1. COVID-19, the megatrends and jobs

4.1.1. COVID-19 has had major impacts on families and workers in Australia

The first COVID-19 cases were reported in Australia in late January 2020. In mid-March, the government introduced initial measures to slow down the spread of the virus, including mandatory self-isolation of arriving travellers, the implementation of contact tracing and expansion of testing services. The government also introduced a first economic stimulus package to support the impacts on the economy. Towards the end of the month, lockdown restrictions limiting citizens' movements and reducing opportunities for public gatherings were progressively implemented to reduce the risk of local infections. In April 2020, the number of cases declined in Australia. However, from mid-June 2020, cases increased and peaked in early August 2020. Since then, the number of new cases reported each day has been decreasing. On 1 November 2020, Australia recorded zero cases of community transmission nationwide for the first time since 9 June 2020. In the following months and through the beginning of 2021, localised restrictions have been imposed across Australia in response to local outbreaks.

While Australia has rebounded quickly from the pandemic, albeit some states and territories have been hit harder than others where the recovery has been slower. By mid-June 2021, Victoria had a total of about 20 000 confirmed cases since the pandemic began, accounting for nearly 70% of total cases in Australia, and recorded about 800 COVID-19-related deaths (90% of total deaths in Australia). On the other hand, about 170 cases were confirmed in the Northern Territory, with zero deaths. As of August 2021, the number of COVID-19 cases in New South Wales surpassed Victoria but the number of COVID-19 deaths remained lower than in Victoria.

As localised COVID-19 outbreaks continue to be recorded across the country, Australia's response to COVID-19 has included regionally targeted restrictions where necessary. In June 2020, restrictions had been reinstated in the state of Victoria as new COVID-19 clusters began to be recorded, in an apparent second wave of infection, leading to a state of emergency until November 2020. Melbourne was in strict lockdown for longer than the remainder of Victoria over the 2020 winter, and outbreaks have led to regional lockdowns in North-West Tasmania, the Northern Beaches of Sydney and several other regions. A new state of emergency was declared in Victoria at the end of January 2021 (Department of Health, 2020[1]).

COVID-19 took a heavy toll on the Australian labour market. The number of employed people in Australia dropped by almost a million between March and May 2020. Employment started to rebound in June, when about 240 000 jobs were added, and continued to do so in July (103 000 jobs) and August (148 000 jobs), although employment fell again in September (-46 000 jobs). Total employment stood at 13.2 million in July 2021, surpassing the pre-pandemic mark. COVID-19 led to dramatic increases in unemployment rates in Australia. For the first time in over 20 years, Australia's unemployment rate rose to over 7% in June 2020. It decreased to 4.6% as of July 2021.

4.1.2. Both the federal and state/territory governments have taken action to support families and workers during COVID-19

The Australian Government took immediate action to support Australians during the COVID-19 pandemic. The health response to the pandemic has been guided by the Australian Health Sector Emergency Response Plan for Novel Coronavirus (COVID-19 Plan), designed to support and help co-ordinate government health agencies. The government has introduced economic support stimuli to provide timely support to affected workers, businesses and the broader community (Department of Health, 2020[2]). As outlined in the Australian Government's Budget 2020-21, released in October 2020, since the onset of the COVID-19 pandemic, the government has provided more than AUD 500 billion of support in response to COVID-19, of which AUD 257 billion in direct economic support to cushion the blow and strengthen the recovery. It has done so for example through the JobKeeper Payment scheme, a subsidy for businesses

significantly affected by COVID-19, the Boosting Cash Flow for Employers programme, providing payments to help keep businesses operating, pay rent, electricity and other bills and retain staff. In addition, the government has provided income support to Australians, through the Coronavirus Supplement and AUD 750 payments to those on certain income support. Since measures were first introduced in March 2020, the government has extended and further tailored temporary economic measures to support sectors, regions and communities. These actions have the objective of supporting the economy during unprecedented times and setting the foundation for a strong recovery going forward.

The 2020-21 government Budget included further commitments bringing the overall support provided by the Australian Government to AUD 507 billion, including AUD 257 billion in direct economic support. The government's response continues to be temporary and targeted, using existing delivery mechanisms where possible. The Budget foresees a comprehensive set of reforms, in the areas of taxes, jobs, welfare, education and small businesses among others. Businesses will receive up to AUD 200 per week to hire young Australians, with the objective of reversing the increase in youth unemployment witnessed during the recession. The Australian Government has also partnered with state and territory governments to establish a new AUD 1 billion JobTrainer Fund. Through the fund, job seekers and young people, including school leavers, will be able to take advantage of subsidised training to learn skills for jobs in demand. The government is providing AUD 500 million in 2020-21 and this is being matched by contributions from state and territory governments. Subsidies will be available to employers to keep apprentices and trainees in work (Australian Government Department of Education, Skills and Employment, 2020[3]). At the time of writing, the JobKeeper payment and the Coronavirus Supplement have both been extended until March 2021. The government's plan is reflected in the revised Economic and Fiscal Strategy, setting the focus on driving the economic recovery to strengthen the budget position in the near term, then stabilising and reducing debt as a share of the economy over the medium term (Australian Government, 2020[4]).

Australian state and territory governments have announced a range of economic and social measures in response to COVID-19. The Commonwealth, State and Territory governments have agreed to introduce a range of measures to help commercial and residential tenants during COVID-19. These include temporarily halting evictions and providing rent reductions for eligible commercial tenants at least proportionate to their decline in turnover. New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory have extended the relief measures until at least December 2020. Most states and territories have introduced grants and tax relief, as well as fees and other charges relief (CPA Australia, 2020[5]). In addition, state and territory governments have developed plans to support the economy in the recovery, building on local assets and opportunities. As an example, the Government of New South Wales has introduced a COVID-19 Recovery Plan, aiming to promote innovation, foster local resilience and future-proof its state economy (see Box 4.1).

Box 4.1. COVID-19 Recovery Plan in New South Wales

In July 2020, New South Wales has unveiled the COVID-19 Recovery Plan, outlining the government's six-step strategy to support families, workers and businesses recover from COVID-19. The Plan focuses on the following key areas:

- **Infrastructure pipeline**: The New South Wales Government is committing to a guaranteed AUD 100 billion infrastructure pipeline over four years to drive employment growth and help create 88 000 direct jobs. This includes an AUD 3 billion accelerator fund.
- **Planning and precincts**: The state's Planning System Acceleration Program brings forward reforms to support productivity, investment and jobs during COVID-19 with a Delivery Unit focused on unblocking programmes caught up in the system. As of July 2020, about 49 projects have been approved.
- **Education and Skills**: New South Wales is currently overhauling its school curriculum in its biggest shake-up in 30 years. The curriculum review has the objective of providing young people with the skills needed in a post-COVID-19 economy.
- **Digitisation**: The pandemic is highlighting the importance of quality interactions with government. New South Wales is committed to revolutionising the way citizens interact with government by adopting innovative digital models and shared services, and replacing cumbersome manual processes.
- **Advanced manufacturing and local supply chains**: The onset of the COVID-19 pandemic revealed the importance of a local manufacturing supply chain and highlighted some of the state's unrealised industry capabilities. With a collaborative research and development centre at the core of the new Western Sydney Aerotropolis, the New South Wales Government is positioning Western Sydney to become the national capital for advanced manufacturing.
- **Federal state relations**: With a National Cabinet replacing the Council of Australian Governments (COAG), New South Wales is promoting continued reform to tackle other cross-jurisdictional areas, such as improving the taxation system and exploring opportunities for asset recycling, deregulation and service innovation.

Source: New South Wales Government (2020[6]).

4.1.3. Prior to COVID-19, automation and other megatrends were re-shaping labour markets

Prior to COVID-19, economic, demographic, and environmental trends were changing the geography of jobs, the demand for skills, as well as the composition of local workforces. These changes have had many positive effects, including longer and healthier lives, safer workplaces, and more productive economies. Yet, they have also generated substantial uncertainty about the future. Indeed, job stability has been decreasing and skill gaps have been growing in recent decades. Ongoing shifts could also reinforce geographic divides, as large cities and other places already ahead are generally better poised to reap the benefits of these changes (OECD, 2020[7]).

Over the past decades, fear of technological unemployment has mounted across OECD countries, as automation, digitalisation and new technologies have changed the way we live and work. Automation and new technologies have traditionally contributed to increased productivity since the invention of the wheel. However, the labour-saving effect of automation has always generated debate around technological unemployment. While the productivity gains from automation are immediate, it might

take time for workers to re-train and find other jobs. Despite fears, technological innovations have historically given rise to new jobs, while the productivity growth from automation has been an important driver of rising living standards (OECD, 2018[8]).

Chapter 2 of this report presented results on the impacts of automation at the local level in Australia. Australia overall faces a lower risk of automation than on average across the OECD (about 36% vs. 46%). However, regional differences in the risk exist within all Australian states, with some showing higher regional variation than others. For example, in Queensland, the risk of automation varies from 41.2% in Mackay - Isaac - Whitsunday to 27.7% in Brisbane Inner City. The drivers of the risk of automation depend on the occupational profile of local labour markets. In rural regions, the risk of losing jobs to automation relates to the prevalence of skilled occupations in Agriculture. This is the case of South Australia-South East (South Australia), where 40.3% of jobs are at risk. In some regions, the risk is driven by occupations which are common to the mining sector, such as in Mackay-Isaac-Whitsunday (Queensland). Regions at risk of automation also tend to have high employment shares in Manufacturing. Other regions are characterised by the prevalence of jobs in occupations at risk across sectors. The net-zero carbon transition is also likely to have an adverse impact on jobs in manufacturing and mining which could exacerbate regional labour market inequalities (OECD, 2021[9]).

While some jobs are likely to disappear due to automation, a larger share is likely to undergo significant change in the type of skills they require. Automation will likely impact selected tasks within jobs rather than replacing entire jobs. This could lead to improvements in the quality of jobs: dangerous or boring tasks can be automated; people can choose where and when to work more freely, resulting in a better work-life balance; work environments can be made safer and healthier; and informality could be reduced (OECD, 2019[10]). Structural change creates employment opportunities in some occupations and industries and decreases opportunities in others, and thereby changing the types of skills that are needed in the labour market. In the past decade, some countries have seen their economies transform more rapidly than others, implying a greater need to re-train workers (OECD, 2019[11]). Whether workers lose their jobs or have to adapt to new tasks in light of automation, adult learning systems play a key role in up- and re-skilling to meet new skill needs. In Australia, more adults participate in training than on average across the OECD (48% and 40% during a 12-month period). However, the share drops to 23% for low-skilled adults and to 32% for older adults aged 55 and over. In addition, participation in training has decreased over the past years (OECD, 2018[12]).

Automation will also create jobs, but these will not necessarily be in the same places as the jobs that were lost. On average, regions with a lower-educated workforce and that are less urbanised have a higher share of jobs at risk. In past waves of technological change, cities that already had a highly skilled workforce have benefited the most from the new, complementary jobs created. They attracted more high-skill jobs and workers, and reaped the spill over benefits in terms of other local job creation (e.g. as a result of increased demand for local services such as restaurants, hairdressers, etc.) (OECD, 2020[7]).

4.1.4. COVID-19 will accelerate automation and impact other ongoing transitions

The long-term impacts of COVID-19 on local labour market outcomes will become clearer with time, but there is a major risk that it could accelerate the pace of automation in the labour market, exacerbating economic and social inequalities worldwide. Investment in automation typically comes with uncertainty, and firms may lack the resources to undertake it in times of economic downturn. However, to reduce their exposure to any potential future social distancing and confinement measures, more firms could decide to invest in technology to automate the production of goods and services. The adoption of automation in the workplace tends to accelerate in times of economic crises, as firms replace workers performing routine tasks with a mix of technology and better skilled workers (Muro, Maxim and Whiton, 2020[13]). Already in one February/March survey, 36% of top executives said they were accelerating investment in automation as a result of COVID-19, and a further 41% said they were currently re-evaluating

their strategies in this area (EY, 2020[14]). The increasing adoption of automation technologies also emerges from the production and sale of robots. In Japan, sales of industrial robots outperformed those of industrial machinery, while in August, China recorded a 14% annual growth in the production of industrial robots. The International Federation of Robotics (IFR) expects the number of professional services robots in operation around the world to increase by 38% in 2020 and that growth to continue in the next two years (Financial Times, 2020[15]). Research on the use of robots in over twenty countries, including China and the United States, also found that ground and aerial robots are playing a crucial role in almost every aspect of managing the pandemic. For instance, doctors, nurses and family members are using robots to interact in real time with patients from a safe distance, while outside of hospitals, robots are being used to spray disinfectant throughout public spaces (World Economic Forum, 2020[16]).

Firms in Australia have however been less impacted by COVID-19 than elsewhere across the OECD, with positive impacts on business continuity but potential productivity losses over the longer term. Most firms in the country have been able to return to normal operations since mid-2020. It is therefore likely that the incentives for changing business models and production processes will be limited, compared to other OECD countries that experienced larger disruption. On one hand, this points to overall positive effects for businesses and the economy in Australia, as they navigated the pandemic with less disruption. On the other hand, there may also be a risk that Australia will miss out on the forced change to more productive approaches firms overseas are adopting which may have some long term costs.

COVID-19 has also led to a shift towards online retail and remote working, which could reshape the sectoral composition of the Australian labour market going forward. Restrictions placed on the operation of physical retail stores saw both businesses and consumers turn to online retailing. Online sales have experienced large rises in March and April 2020 at the outset of COVID-19 as customers complied with social distancing regulations, and rises in July and August when Victoria entered a second lockdown (Australian Bureau of Statistics, 2021[17]). The shifts towards online sales could have large impacts in the future composition of the future sectoral composition of the labour market, reducing employment in the retail trade industry but increasing it in sectors such as transportation. At the same time, remote working has peaked in Australia in light of the pandemic, with potential long-term implications. Work from the Institute of Transport and Logistics Studies (ITLS) shows that the number of work from home days doubled for managers and almost tripled for employees in sales and clerical/administration work in Australia during the pandemic. Surveys also show that about 75% of workers think employers will support future work from home plans once the pandemic has passed (University of Sydney, 2020[18]). Over the longer term, increased remote working could reduce the demand for commercial retail/office buildings as well as commuter infrastructure, reducing employment in the construction industry, and increasing it in technology and other industries,

Finally, in addition to its labour market impact, the pandemic could transform many other ongoing economic, demographic, and environmental shifts into abrupt changes, making the transition even more difficult for some people and places. It could also reorient trends such as urbanisation and globalisation, opening up new opportunities for places that previously risked being left behind. Managing supply chain risks could result in re-localisation and consumer preferences could shift towards greener consumption. There are also additional environmental imperatives that will require more greening of construction, manufacturing, mining, transport and many other sectors. Some population may flow away from large, urban areas, and rural areas might be able to attract new residents, helping to offset an ageing population. The pandemic could also decelerate the international movement of workers and students, at least in the short term (OECD, 2020[7]).

4.1.5. Local actors will play a key role in supporting transitions in light of COVID-19 and the future of work

In Australia, local governments have important responsibilities for the employment, skills, and economic development policies that can help workers and firms transition to the future of work. There are three layers of government in Australia: federal, state/territory and local government. As direct providers of local services with significant responsibility for administrative and governance functions that enable delivery, local governments are significant stakeholders within communities and the broader service delivery environment. Increasingly, local governments are becoming the principal providers of government services to local communities on behalf of state, territory and Commonwealth governments, as a more contextually responsive and localised approach to government service delivery is seen to be the most appropriate mode (Australian Centre of Excellence for Local Government, 2013[19]). Going forward, they are likely to take on larger roles as the employment policy response transitions from delivering benefits to helping unemployed workers transition to new opportunities. Local capacities will need to be upgraded to meet these increased demands.

Local actors are also well-positioned to co-ordinate across policy areas. For example, due to their understanding of local labour market dynamics, they can help identify and deliver the types of training needed to help displaced workers transition quickly from shrinking to growing sectors. Partnerships across local economic development agencies and training institutions can help local SMEs both secure financial resources and expertise to integrate new technologies into production processes, and upgrade the skills of their workforces to put them to good use.

COVID-19 and the general downturn will exacerbate poverty and deprivation worldwide, and local governments will have to pick up many of the pieces. In a number of countries, local governments are directly responsible for benefits for the long-term unemployed or other social assistance recipients. Even in countries where subnational governments are not responsible for these benefits directly, it often falls on the shoulders of local actors to support those in the most precarious situations via emergency housing, material assistance such as food banks, health and mental health support, among others (OECD, 2020[7]).

4.2. Preparing Australians for a changing labour market

4.1.1. Local jobs programmes have been introduced to support workers impacted by COVID-19

A number of place-based programmes have been introduced in Australia. Acknowledging the urgency in assisting job seekers navigate change, together with longer-term trends impacting skill requirements in many jobs, the Australian Government has introduced the Local Jobs Program. Through the Local Jobs Program, Employment Facilitators will work with employers and other key local stakeholders to develop employment solutions at a local level and support Australians back into work. The programme focuses on re-skilling, up-skilling and providing employment pathways to assist people to move back into jobs as the economy recovers. Recognising the importance of local knowledge in getting people back into jobs quickly, the Australian Government's Local Jobs Program has:

- put in place local Employment Facilitators
- create Local Jobs and Skills Taskforces and
- provide Local Recovery Funds to support small scale projects, in 25 employment regions across Australia.

Employment Facilitators are dedicated individuals who work with local job seekers in specific regions to connect them with training, job opportunities and other support. As part of their role, facilitators chair Local Jobs and Skills Taskforces across 25 regions and work with local stakeholders

including employers, employment services providers and training organisations to drive the development of a Local Jobs Plan. Facilitators also support local stakeholders to create targeted projects that meet the priorities of the plan. They work with organisations that apply for funding through the Local Recovery Funds to ensure employment opportunities are maximised. Employment Facilitators are also contracted in regions facing structural change, for instance in regions in New South Wales, South Australia, Tasmania and West Australia. Not all these regions are Local Jobs Program regions, and contracting of facilitators is for a longer term, recognising the enduring impact of structural change.

Box 4.2. Establishing local boards or facilitators: the experience of other OECD places

Many OECD countries are looking for opportunities to promote more place-based responses to employment and skills training. The type and nature of local response varies with some countries providing more autonomy to the local level in actively deciding on the management and delivery of programmes and services.

Ontario, Canada

Launched in 1994, Workforce Planning Ontario, a network of workforce planning boards, has the mandate to connect stakeholders within the labour market. Workforce Planning Ontario includes a network of 26 Workforce Planning Board areas covering four regions across the province. Each board gathers intelligence on local labour supply and skills demand, by liaising with employers to identify and meet their current and emerging skills needs. The primary role of Workforce Planning Boards is to help improve understanding of and co-ordinate local responses to labour market issues and needs.

United Kingdom

There are 38 Local Enterprise Partnerships (LEP) currently operating within England. A LEP plays a key role in deciding local economic priorities and undertaking activities to drive economic growth and create local jobs. Each LEP is overseen by a Board, which is led by a business Chair and its board members are local leaders of industry (including SMEs), educational institutions, and public sector representatives.

United States

There are over 600 Workforce Investment Boards (WIBs) that are responsible for providing employment and training services within a specific geographic area in the United States. The number of WIBs within each state varies by population, geographic size and a state's approach to service delivery. The federal legislation, through the Workforce Investment and Opportunity Act, requires that at least 50% of WIB members come from local firms in a community, which helps to ensure that each board is demand-driven.

Source: OECD (2014[20]; 2020[21]; 2020[22]).

Local taskforces will identify key employment priorities, local labour needs and help design potential solutions. Taskforces will consist of local business, employment services and training providers and other key stakeholders. The taskforces will develop a Local Jobs Plan, identifying the region's priorities and opportunities, and solutions to support job seekers in meeting local employers' requirements. This will be supported through information provided by the National Skills Commission and the National Careers Institute. The establishment of local boards to develop solutions to labour market challenges is a common initiative across OECD countries (see Box 4.2).

Measures to help worker re-skill and up-skill, transitioning into new sectors, have also been introduced in several OECD countries. For example, in the United Kingdom, a Lifetime Skills Guarantee has recently been announced, with the objective of helping people, especially workers in sectors heavily impacted by COVID-19, transition into new job opportunities. In addition, Scotland has introduced a National Transition Training Fund, to support job transitions (see Box 4.3).

Box 4.3. Supporting workers re-skill and up-skill in light of COVID-19: examples from the United Kingdom

Lifetime Skills Guarantee in England

The United Kingdom Government recently announced a Lifetime Skills Guarantee to help people train and re-train at any stage in their lives. The measure includes free technical courses for adults in England who do not possess A-levels or equivalent (corresponding to the Australian Senior Secondary Certificate of Education), as well as digital skills boot camps and adapting student loans for further as well as higher education. The guarantee is intended to help people who need to change jobs to find new opportunities. When announcing the programme, the British Prime Minister gave the example of a retail worker who might want to retrain to work in the wind farm sector, space technology, construction or low-carbon home retrofitting.

Analysis from Nesta, a British innovation foundation, points to the importance of complementing the Lifetime Skills Guarantee with other measures. Workers in transition typically need more information on what jobs are growing and declining, and which jobs have the best long-term prospects. The foundation argues that in addition to access to courses and the tools to help with decision-making, a Lifetime Skills Guarantee could include for example workers' rights to receive training, and incentives for employers to provide that training to their staff.

The National Transition Training Fund in Scotland

In Scotland, people who have lost their jobs or who are at risk of redundancy as a result of COVID-19 can access support to re-train through a recently introduced fund. The GBP 25 million National Transition Training Fund aims to support up to 10 000 people aged 25 and over to develop skills required to move into sectors with the greatest potential for future growth and job opportunities. The fund has the objective of boosting the skills supply in areas such as sustainable green jobs and raising the profile of training opportunities linked to Scotland's transition to a net zero economy.

The first phase of the National Transition Training Fund will be administered by Skills Development Scotland (SDS) on behalf of Scottish Government. It will work with coaches from the Department for Work and Pensions (DWP) and Partnership Action for Continuing Employment (PACE), the Scottish Government's initiative to help individuals and employers during redundancy situations, advisers from SDS providing advice and support.

Source: Nesta (2020[23]); Scottish Government (2020[24]).

4.1.2. Jobs Fairs moved from physical to virtual fairs as a result of COVID-19

Jobs Fairs bring together job seekers, employers and employment service providers to provide an opportunity for job seekers to talk to employers and learn about jobs, training and career options available in their area. On the day of the Jobs Fair there are also workshops held for job seekers on topics on finding and retaining a job, as well as one-to-one sessions on résumé writing and interview

advice. Traditionally, Jobs Fairs have been held as a physical day-long event, however due to COVID-19 the Australian Government transitioned to holding the physical event to online "virtual" jobs fairs.

Since July 2020, 11 virtual Jobs Fairs have been delivered to assist job seekers to enter or re-enter the workforce. Elements such as workshops have been retained, with the both "live" and "on-demand" workshops available. The traditional jobs board is also available online, with links to the employer booths, so that job seekers can chat in real time, online, to prospective employers about the jobs.

Some fairs have focussed on jobs within specific regions or specific industry sectors. For example, in November 2020 the National Harvest Virtual Jobs Fair was held, to help address labour shortages in the agriculture sector. This fair focussed on ensuring that employers that had jobs available were connected with job seekers looking for work, as well as provide information about working in harvest roles. Over 2 710 job seekers attended this virtual Jobs Fair with over 26 000 jobs available on the day.

4.1.3. Public employment services are under reform to become more responsive to the future of work

jobactive is the main employment services programme in Australia, which features a digital service for the most job ready job seekers and a network of service providers in over 1 500 locations across Australia, delivering employment support programmes and services for job seekers who require additional assistance. Since July 2019, retrenched workers and their partners have been able to access jobactive immediately after being retrenched, thanks to the Job Seeker Classification Instrument (JSCI). In jobactive, job seekers in the digital service can use online tools to improve their job readiness and employability skills and prepare employment applications. Job seekers in provider service can receive additional assistance to achieve these goals as well as addressing any non-vocational barriers they may have. Service providers can match job seekers with suitable work experience placements including through compulsory activities such as the Work for the Dole programme. Providers also support jobseekers and their employers once placed in a job, by giving access to other types of supports, including wage subsidies and or relocation assistance, and ensure that all job seekers are treated fairly and with respect in a culturally sensitive way (OECD, 2019[25]).

Employment services are being transformed in Australia to deliver better services to job seekers and employers and a better system for providers, tapping into the potential of digital technologies. The development of the new employment services model involved extensive consultation with more than 1 400 stakeholders including job seekers, employment services providers, industry representatives, employers and peak bodies, and independent advice delivered by the Employment Services Expert Advisory Panel in its report to Government. The new model is being trialled in two regions from July 2019 before being rolled out nationally from July 2022. Digital job matching platforms can be instrumental in reducing spatial barriers to employment, engaging communities facing more labour market hardship than others, such as Indigenous People (Raderschall, Krawchenko and Leblanc, 2020[26]).

The new model foresees two main work streams, depending on the job-readiness and skills of job seekers. Those who are job-ready and digitally literate will enter the digital service, self-managing online through the digital employment services platform, accessing information, tools, and searching for jobs online. Digital job seekers will report online how they are meeting their requirements, receiving targeted suggestions of activities and options to improve their chances of finding work. Some digital job seekers may receive some additional support with skills or training. Digital job seekers will self-manage online and have additional support available through a contact centre. Should a job seeker need it, they can have access to funding to help with transport or employment-related expenses. They can be connected to an employment services or training provider for specific services such as training to help use the digital service or work skills training. Finally, those with multiple barriers to employment will enter the Enhanced Services stream. These job seekers will receive individually-tailored case management from an employment services provider to help build job readiness, organise training and education, connect with complementary

services and work experience. Job seekers in Enhanced Services will have access to the digital platform and will be supported by their employment services provider to access services online, where appropriate (Australian Government Department of Education, Skills and Employment, 2020[27]). The new public employment service model builds on the opportunities emerging from digital technologies, while acknowledging the potential trade-offs of digital service delivery, and the need for the more disadvantaged job seekers to also receive tailored support from a provider.

Box 4.4. The trade-offs of digital employment service delivery

Employment services are playing an important role in keeping labour markets functioning during COVID-19. To do so, they need to be agile, quickly adapt to the new situation and adjust their response flexibly in the face of unpredictable developments. Across the OECD, many employment services are facing an unparalleled inflow of new job seekers, but cannot meet with their clients in person due to confinement restrictions. At the same time, the number of job offers has shrunk across sectors, leaving employment services with fewer vacancies to propose. Some sectors, such as medical services and agriculture are confronted with severe labour shortages across the OECD.

Digital technology is a key element of the short- and medium-term response by employment services in light of COVID-19. Those that had digital tools in place prior to the pandemic are in a better situation now: the process for benefit applications can remain unchanged and support to jobseekers via distant communication can continue without interruption. Other employment services have set up alternatives, such as call centres.

Digital inequalities are a source of major concern, as those most in need might not have the resources or skills to access digital employment services. Several vulnerable groups, such as older people, less educated people, and people with physical health problems, low literacy levels, or low levels of internet skills, risk being left behind from the opportunities arising from digital employment services. Research shows that generally, people who are already relatively advantaged are also more likely to use the information and communication opportunities provided by the internet to their benefit in a pandemic, while less advantaged individuals are less likely to benefit. Therefore, the COVID-19 crisis risks reinforcing existing digital inequalities and poses challenges when it comes to employment service delivery. If on one hand, governments could take the digital shift happened during the pandemic as an opportunity to bridging digital divides across regions and segments of the population in digital infrastructure and literacy, on the other hand those most in need of employment support during the pandemic might not be able to use digital employment services. Going forward, governments will have to consider these trade-offs and address the challenges linked to digital employment service delivery for the most vulnerable segments of the population. Moreover, ensuring adequate access to high-speed broadband in rural areas could help bridge regional digital divides with regard to internet access.

Source: OECD (2020[7]); van Deursen (2020[28]); OECD (2021[9]).

4.2.1. Actions are being taken to deliver skills for today and tomorrow in Australia

The Australian Government has recently committed to strengthening the vocational education and training sector. This includes the AUD 585.3 million Skills Package Delivering Skills for Today and Tomorrow. The package aims to help train highly skilled and qualified workers, including in regional areas, to meet the needs of industry, acknowledging that a strong VET sector is crucial to prepare Australians for the workforce opportunities of today and the future. The Skills Package lays the building blocks for reforms identified in the Expert review of Australia's vocational education and training system, placing industry at the centre and raising the profile of VET as a career pathway of choice. It takes important steps towards longer term funding and governance reforms to help ensure that the VET system is responsive, well-

respected and flexible into the future (Australian Government Department of Education, Skills and Employment, 2020[29]). As part of the package, the government is providing AUD 52.5 million through the Foundation Skills for Your Future Program to support eligible Australians to undertake further education and training. Eligible employed or recently unemployed Australians can undertake free accredited and non-accredited training to improve their language, literacy, numeracy and digital skills to help them up-skill or re-skill for new roles, to obtain and retain secure employment and to undertake further education and training. The package also includes AUD 9.9 million over three years for a Remote community Pilot in each of South Australia, the Northern Territory, Queensland and Western Australia. The pilots will inform future delivery of English language, literacy, numeracy and digital (LLND) skills training in remote communities and elsewhere.

The Australian Government has invested AUD 48.3 million to establish the National Skills Commission (NSC), which develops independent intelligence on Australia's labour market and current and emerging skills needs. The NSC will drive long-term improvements across the skills system by bringing together existing data to develop new capabilities in skills analysis which will and improve VET pricing and outcomes. The *National Skills Commissioner Act 2020* established a new statutory position – the National Skills Commissioner. The Commissioner performs an advisory function by providing advice on Australia's employment and educational workforce needs; VET performance, course prices and government investment returns; and opportunities to improve VET access and choice in regional, rural and remote areas.

In addition, the Australian Government has explored how large, local and international data sets can help workers and job seekers transfer their existing skills to new jobs and identify new skills to develop. The report *Reskilling Australia: a data-driven approach*, published by the Department of Education, Skills and Employment (known as Department of Employment, Skills, Small and Family Business at the time of the publication of the report), identifies that moving towards a skills-based approach to labour market analysis could help Australia respond to this changing demand for skills. After analysing the US careers database O*Net and Burning Glass Technologies job advertisement data from 2.6 million online job postings in Australia, the department developed a job similarity model, which shows how the skills of one job compare to another to help identify practical avenues to a career change. The Skills Match and JobSwitch tools recently released on the Job Outlook website also use this new model to provide a practical way of helping individuals navigate the changing labour market. The National Skills Commission has taken ownership of this work for the Australian Government going forward.

While the Australian Government has taken important steps to prepare Australians for the future of work, it could also look to examples of other initiatives across the OECD. Among these, individual learning schemes have recently gained prominence in the international policy debates, in light of a rise in non-standard work and an increased fragmentation of workers careers. Individual learning schemes are training schemes attached to individuals (rather than to a specific employer or employment status), which are at their disposal to undertake continuous training along their working lives and at their own initiative. The goal of these schemes is to boost individual choice and responsibility concerning training (OECD, 2019[30]). Such schemes however also come with challenges. For example, if not carefully designed, schemes are more likely to be used by high-skilled workers than low skilled ones, potentially exacerbating inequality in skills outcomes and producing deadweight loss which arise from the fact that some beneficiaries would have participated in training even in the absence of the scheme (OECD, 2019[31]). In addition, ILS generally only cover tuition fees associated with training, and do not cover indirect costs (e.g. child care expenses, transportation costs) or opportunity costs (i.e. wage costs for the time spent off work). This means that on their own, ILAs are unable to address time constraints that prevent adults from participating in adult learning. The introduction of an individual learning scheme should therefore be carefully designed, to avoid market distortions and ensure its broad coverage. Box 4.5 outlines the characteristics of the individual learning schemes introduced in France and in Canada.

Box 4.5. Individual learning schemes: examples from France and Canada

***Compte Personnel de Formation*, France**

Among individual learning schemes, the French *Compte Personnel de Formation* (CPF) is frequently cited as an interesting new approach which could boost participation in the new world of work. It is the only example of individual learning account in the world. Introduced in 2015, the CPF can be used by any employee throughout their working life, including during periods of unemployment, to follow qualifying or certifying training. The CPF replaced the individual right to training (Dif).

The CPF is a virtual, individual account in which training rights are accumulated over time, and it is financed through a compulsory levy on firms. Resources are mobilised if training is actually undertaken. As part of the programme, individuals get EUR 500 per year, capped at EUR 5 000 in the standard case, and training programmes are required to deliver a certificate. The CPF has involved 627 205 participants in 2018 or 2.1% of the labour force.

Canada Training Credit

The Government of Canada has recently announced the Canada Training Benefit (CTB), a programme aiming to help workers re-skill and up-skill in a changing world of work. The CTB would give workers a refundable tax credit on their income tax and benefit return to help offset tuition costs for training, provide income support during training, and offer job protection so that workers can take the time they need to keep their skills relevant and in-demand.

The CTB would include a non-taxable Canada Training Credit (CBT) to help Canadians with the cost of training fees paid to a university, college, or other educational institution for courses at a post-secondary level or occupational skills courses. Eligible Canadian workers between the ages of 25 and 64, earning between CAD 10 000 and the top of the third tax bracket (around CAD 150 000 in 2019) would accumulate a credit balance at a rate of CAD 250 per year, up to a lifetime limit of CAD 5 000. The credit could be used to refund up to half the costs of taking a course or enrolling in a training programme.

Source: Service Public (2020[32]); OECD (2020[21]); Government of Canada (2019[33]).

4.2.2. The government recently introduced skills development programmes to support regional development

An Australian Apprenticeship provides a nationally recognised qualification and on-the-job employment experience. It combines on- and off-the-job learning, can be completed in full-time or part-time patterns, and can be commenced while a learner is still at school. Australian Apprenticeships are available to any Australian of working age, regardless of their level of education, including those who are school-leavers, re-entering the workforce or adult workers simply wishing to change careers. Australian Apprenticeships are available across Australia in a variety of qualification levels and in more than 500 occupations, including traditional trades, as well as emerging careers in most sectors of business and industry.

The Skilling Australians Fund was established as an ongoing arrangement by the Australian Government as part of the 2017–18 Budget. The purpose of the Fund is to ensure that businesses that benefit from employing migrants are also skilling Australians. It does this by encouraging improved employment outcomes in supporting the training needs of Australians prioritised towards apprenticeships and traineeships in industries and occupations in demand.

Since July 2018, the Fund has been managed through the National Partnership on the Skilling Australians Fund, which supports the delivery of state and territory projects. These projects aim to increase the uptake of apprenticeships and traineeships, pre-apprenticeships and pre-traineeships, and other employment related training opportunities. Since 2017, the Fund has provided over AUD 550 million to state and territory projects that has supported almost 130 000 additional apprenticeships, traineeships, pre-apprenticeship and traineeships and other employment-related training activities. The Skilling Australians Fund levy is the principal mechanism for raising revenue for the Fund. The levy is paid by employers who sponsor skilled workers from overseas, under certain visa classes. The collection of the levy in this way means that employers seeking to access skilled workers from overseas are contributing to the skills development of Australians.

Under the National Partnership, projects delivered by the states and territories are set out in individual bilateral agreements between the Australian Government and six participating states and territories (New South Wales, Western Australia, South Australia, Tasmania, the Australian Capital Territory and the Northern Territory). In addition to a description of the project, each agreement includes the level of funding commitments (including matched funding and funding for their state skills system), performance benchmarks for additional training places, and milestones. Any differences in the agreements are to accommodate the vocational education and training (VET) system and industry needs in each state and territory. To receive a payment from the Fund, the states and territories are required to report to the Commonwealth on 30 April each year. The reports are assessed against the requirements in the National Partnership and the bilateral agreement. Funding is then allocated based on their achievements and the funding amounts in the bilateral agreement.

The projects under the National Partnership were developed by the states and territories and considered by the Australian Government. The projects funded are prioritised towards those that support training in occupations in high demand that currently rely on skilled migration, future growth industries, and in rural and regional areas. The projects also need to demonstrate engagement with, and support from, industry and employers (Australian Government Department of Education, Skills and Employment, 2020[34]).

Box 4.6. Example of projects under the National Partnership in the Australian Capital Territory

The Australian Capital Territory's (ACT) Skilling Australia's Capital Region aims to contribute to the growth of a highly skilled workforce by:

- **Understanding and removing the barriers to training by**: increasing Registered Training Organisations subsidies to reduce upfront cost for new students; targeting support for Australian Apprenticeships; and reviewing the Forecasting of Industry Needs and Entitlement model and ACT Government funding model to meet industry needs
- **Encouraging market diversification by**: revising the ACT Adult and Community Education Grant program, support for the Future Skills Jobs Grant Program and innovative projects with industry to identify new employment pathway opportunities; delivering new and expanded pre-employment and pre-apprenticeship initiatives and expanding pre-employment initiatives and the Australian School-Based Apprenticeship initiatives
- **Increasing collaboration with industry by**: enhancing the My Profiling Tool; and trialling programs through the Australian Apprenticeships Growth Project to support ACT Public VET Network to meet increased demand for Australian Apprenticeship commencements; and working with local industry to build awareness and undertake promotion and advocacy to attract potential employers and participants in VET
- **Valuing VET as a pathway to a rewarding career by**: delivering targeted campaigns and leveraging existing communication activities to educate employers and raise awareness within local industry and schools about VET pathways and support services; and developing an ACT VET Investment Plan.

Source: Australian Government Department of Education, Skills and Employment (2020[34]).

4.2.3. Australia is reforming its training system to make it more responsive

Australia's vocational education and training (VET) system supports the needs of industry by providing workplace skills and knowledge-based competencies for a wide range of occupations through a variety of training institutions and enterprises. The system provides training for learners of all ages and backgrounds. Learners have many options for training and may study individual units, sets of units (skillsets) to target an identified need, or full qualifications. Training and assessment takes place in classrooms, workplaces or online, and can be either full-time or part-time. There are around 4 million students (including overseas students) enrolled in our training system, or one in four working age Australians.

Training packages are a key feature of Australia's national VET system. A training package is an Australia-wide set of industry-endorsed standards and qualifications for recognising and assessing peoples' skills in a specific industry, sector or enterprise. Australia maintains high-quality VET outcomes through several regulatory frameworks. The national VET regulator, the Australian Skills Quality Authority, registers training providers, monitors compliance with national standards and investigates quality concerns. In Victoria and Western Australia, the Victorian Registration and Qualifications Authority and the Training Accreditation Council Western Australia perform these roles. The Australian Qualification Framework ensures qualifications meet national expectations for quality and consistency (Australian Government Department of Education, Skills and Employment, 2020[35]).

VET delivery in Australia is largely government-funded and reflects agreements between, and skills and labour needs identified by, the federal and state and territory governments. However, companies

and individual learners may also contribute to the cost of training. For example, companies may purchase training or assessment services for their employees, while students frequently contribute to the cost of training through the payment of supplementary course and administrative fees. About 4 100 registered training organisations deliver VET in Australia. These include public TAFE institutes, universities, secondary schools, private training providers, enterprises, industry organisations, adult and community-based education providers. The training.gov.au website is the official national register of VET in Australia and an authoritative source of information on training packages, qualifications, accredited courses, units of competency, skill sets and registered training organisations (Australian Government Department of Education, Skills and Employment, 2020[36]).

The Australian Government has implemented substantial reforms of its VET system since 2014. Ongoing developments aim to ensure VET continues to deliver the skills required by industry, and meets the needs of the economy. At the national level, Australia's VET system is led by a council made up of Australian, state and territory government ministers responsible for skills development and national training arrangements. The Council of Australian Governments (COAG) Skills Council provides leadership and direction for the skills sector. The council has streamlined governance arrangements, policy development and the oversight of the performance of the VET sector. As a result, the Australian Industry and Skills Committee was established to provide industry with a formal role in advising the COAG Skills Council on policy directions and decision making in the national training system (Australian Government Department of Education, Skills and Employment, 2020[36]). Australia could look to reforms being introduced in other OECD countries to make post-secondary education, including VET, more responsive to the labour market. A recent reform has been introduced in the Province of Ontario, Canada, with the objective of aligning post-secondary institutions funding with labour market performance (see Box 4.7).

The government is also piloting Skills Organisations to enhance the role and leadership of industry in the skilling of workers and to test and trial ways to improve the efficient operation of the VET system. Skills Organisation Pilots have been established in three key industries – human services, digital technology and mining (see Box 4.8 for a focus on mining). The Skills Organisations are exploring potential system designs, organisational approaches and ways to strengthen industry engagement and improve the long-term outcomes of all stakeholders. Skills Organisations are working collaboratively with the Australian Industry and Skills Committee (AISC), the National Skills Commission (NSC) and the National Careers Institute (NCI) to deliver better outcomes for industry and a more flexible and responsive VET system. The three pilots are trialling new ways of working to shape the national training system to be more responsive to the skills needs for those industries, to ensure that training is relevant to employment. Lessons from the pilots will help inform broader improvements to the national training system (Australian Government Department of Education, Skills and Employment, 2020[37]).

In addition, the VET Student Loans programme assists eligible students pay tuition fees for accredited VET courses. The programme is being reviewed to inform potential changes, and the role it plays in the overarching VET funding model in Australia (Australian Government Department of Education, Skills and Employment, 2020[29]).

Box 4.7. International lessons in reforming post-secondary education in Ontario, Canada

The Ontario Government has signed agreements with public colleges and universities to help students get the education, skills and experience they need and find good jobs, by ensuring post-secondary institutions offer programmes aligned with labour market demands. The agreements, which are in effect from 2020-2025, introduce a new "made-in-Ontario" performance-based funding model that places a higher weighting on student and economic outcomes. College and university operating funding will be increasingly tied to performance on 10 measures, rather than on enrolment. Institutions will report on indicators including graduate employment rates in related fields, experiential learning and graduate earnings. By 2024-25, the government estimates that 60% of institutions' operating funding will be performance-based. The government provides about CAD 5.2 billion in operating funding annually to support Ontario's 21 publicly-assisted universities and 24 publicly-assisted colleges. So far, most of the operating funding has been based on enrolment. Only a small proportion of funding is currently tied to performance.

Source: Government of Ontario (2020[38])

Box 4.8. Boosting future skills for the mining sector in Australia

The Australian Government is piloting Skills Organisations to enhance the role and leadership of industry and to test and trial new ways to improve Australia's vocational education and training (VET) sector. The Skills Organisations are also designed to improve industry engagement arrangements and are part of the Australian Government's broader reforms under the Heads of Agreement for Skills Reform.

The Mining Skills Organisation Pilot, which commenced in May 2020, will work with industry to make sure workers have the right skills to match future mining needs. Mining continues to be one of the largest employers and areas of GDP growth for Australia, with over 261,000 people employed in the industry as at November 2020. At the same time, the mining industry is undergoing large-scale shifts as a result of increasing automation, changing technologies and future global demands. As such, the Mining Skills Organisation Pilot is trialling innovative new ways to shape the national training system to be more responsive to industry's skill needs and to ensure that employers have confidence in the quality of VET graduates, now and into the future.

Source: Australian Government Department of Education, Skills and Employment (2019[39]); Australian Bureau of Statistics (2021[40])

4.3. Helping places transition into the future of work

4.3.1. Regional Development Australia (RDA) is a main player for local development in Australia

Regional Development Australia (RDA) is a network of 52 committees and the Indian Ocean Territories Regional Development Organisation (collectively referred to as RDA Committees) bringing together leaders at all levels of government, business and community groups to support

the development of their regions. In particular, the RDAs are focused on connecting local businesses to industry in order to create more jobs and attract more local investment (OECD, 2019[41]). It is funded by the Australian Government and by state, territory and local governments in some jurisdictions. It is administered by the Department of Infrastructure, Transport, Regional Development and Communications.

RDA Committee members are local people developing local solutions to local issues. They build partnerships to develop strategies and deliver sustainable infrastructure and services to their regions. They also work with each other to identify issues that cross regions. As the regional development voice of their regions, RDA Committees consult and engage with local communities; promote and participate in regional programs and initiatives; provide information and advice on their region to all levels of government, and; support informed regional planning (Regional Development Australia, 2020[44]).

During COVID-19, RDA Committees have provided the Australian Government with real-time, local intelligence from every region of the country. Information has been gathered through teleconferences between RDA Committee representatives and the responsible Minister, held up to three times per week. This information has been shared with Government Ministers, agencies and state government representatives through bulletins produced and distributed on the same day as the teleconferences. This real-time intelligence has informed Government policy making and provided valuable information about the effectiveness of programs, allowing for adjustments to be made to improve outcomes.

Box 4.9. The STEMship programme by RDA Hunter (New South Wales)

STEMship is a vocational education & training (VET) programme developed in 2016 by RDA Hunter in partnership with the Department of Industry – Training Services NSW and TAFE NSW. It is funded by Defence NSW through Training Services NSW with the multi-disciplinary training component delivered by TAFE NSW.

This innovative pre-employment programme is industry led and incorporates modules on science, technology, engineering, mathematics (STEM) as well as enterprise and entrepreneurship skills development activities. Designed as an alternative pathway to direct university entry following secondary school, STEMship aims to transition participants out of school and into employment via technical apprenticeships, traineeships, and further study. Pivotal to the programme's design is an industry-led approach, which provides a VET pathway for students to move into employment, highly technical apprenticeships and traineeships, higher-level Certificate IV, Diploma qualifications, or University

STEMship promotes job creation in the Hunter Region by providing young adults with specific job skills and access to on-the-job placement in industries such as defence and advanced manufacturing. Participants are exposed to a combination of work placements and post-secondary courses (units of competency) focusing on developing STEM capabilities, digital literacy, soft skills, and understanding of current industry workforce requirements. In-class training follows a multidisciplinary design, which allows students to gain skills from multiple training packages (19 units of competency across 7 different training packages). Learning is project-based, meaning students develop skills from different units of competency through a single project.

Source: RDA Hunter (2020[42]); OECD (2019[43]).

4.3.2. The Regional Employment Trials (RET) program has been established to support disadvantaged regions

Recognising that some regions face more challenges than others in terms of employment and economic outcomes, the Australian Government has introduced the Regional Employment Trials (RET) program in ten disadvantaged regions. Running from 1 October 2018, the RET program was initially foreseen to end in 2020, but COVID-19 has led the government to extend it until 30 June 2021. A precursor to the newer Local Jobs Program, the RET program takes into account regional variations to help ensure that local economic opportunities are better promoted to Australians looking for work and employment services providers. In trial regions, Employment Facilitators work with Regional Development Australia (RDA) committees to enable local stakeholders to address employment issues. RDA committees play a key role in the identification, assessment and promotion of RET projects to ensure they align with local needs. Stakeholders could include local governments, employers, training organisations, not-for-profits, employment services providers and other community organisations able to provide employment and training related opportunities and assistance to unemployed people (Australian Government Department of Education, Skills and Employment, 2020[45]). The trial aims to achieve the following objectives:

- stronger connections between regional stakeholders, including employment services providers;
- tailored employment initiatives that meet local needs;
- improved awareness of local labour markets;
- the potential for improved regional employment outcomes.

The RET program is targeting regions facing challenges in terms of employment opportunities. This includes the Regional Development Australia regions of Northern Inland (NSW), Far South Coast (NSW), Wide Bay Burnett (QLD), Murraylands and Riverland (SA), Yorke and Mid North (SA), Gippsland (VIC), Peel (WA) and DESE Employment Regions Western Melbourne/North Western Melbourne (VIC), North and North Western Tasmania (TAS) and Townsville (QLD). As at 31 December 2020, 111 projects have been approved, totalling around AUD 9.996 million in RET funding. Of the 111 approved projects, 63 have been completed and 48 are underway. Around 6,300 unemployed people were expected to participate in these projects, however the COVID-19 pandemic has affected this (Australian Government, 2019[46]).

A Local Employment Initiative Fund was established to provide grants for employment-related projects to local stakeholders. The fund has a budget of AUD 10 million and was available across the 10 RET regions, providing grants of between AUD 7 500 and AUD 200 000. Local stakeholders in the selected regions developed project proposals for initial consideration by their local RDA committee. To facilitate a strong connection with employment programs, all projects partnered with at least one employment services provider. Activities are aimed to better connect employers with regional Australians looking for work, identify future employment, training or work experience opportunities, and help address local skills gaps. Initiatives were tailored to the opportunities and needs in each selected region. Examples included pre-apprenticeship placement programs; mature aged residents and local business leaders mentoring job seekers; preparing job seekers to be skilled and ready for employment in up-coming infrastructure projects; work experience projects aligned with local employment opportunities.

Australia could also look to initiatives undertaken in other countries in support of regions facing structural labour market challenges. For example, a few years ago the European Union (EU) introduced a Youth Employment Initiative, specifically targeting regions across the EU with high youth unemployment rates. Funding has been allocated centrally, and the programme has been implemented at the local level by regional governments. Both national and regional governments have played a role in the implementation of the scheme in the different regions. The Youth Employment Initiative has achieved positive results over the years of its existence and could therefore represent a potential source of inspiration. See Box 4.11 for more details about the programme.

Box 4.10. Regional Employment Trials in Far South Coast, New South Wales

The Far South Coast (FSC) of New South Wales is a coastal region covering the area from the village of Berry in the north to the border with Victoria in the south. It is made up of three local government areas – Shoalhaven City, Eurobodalla Shire and Bega Valley Shire. The FSC is renowned for its 400 km of coastline, numerous marine parks, thirty-one national park areas and extensive areas of state parks. In the FSC region, Health Care & Social Assistance is the largest employer, accounting for about 13.9% of total employment. Retail Trade is the second largest industry, employing 13.1% of the workforce. This is largely due to the inflow of tourists in the region. Tourism employs 10.1% of workers, Construction 9.4% and Public Administration & Services employ 8.4% of the workforce (Regional Development Australia Far South Coast, 2018[47]). In early 2020, the FSC was significantly impacted by bushfires and to date, rebuilding is still underway. FSC also suffers from higher unemployment rates than the rest of New South Wales. The area has been characterised by an ageing population, a large share of youth leaving for study and work, and a high share of disengaged youth among those remaining in the area (Department of Employment, 2014[48]).

Nine projects have successfully applied for funding under the Regional Employment Trials in the Far South Coast region, including:

- **Shoalhaven Business Chamber**: received funding to run a major event for job seekers entitled "What Employers Want", held in November 2019 and bringing together employers and job seekers in the region for an afternoon of information sharing, job coaching and one on one advice;
- **Eurobodalla Shire Council**: received funding to appoint a co-ordinator to develop and deploy a programme for strengthening links between job seekers and aged and community care organisations in the area who are looking to recruit;
- **Aged and Community Services Australia**: received funding to run a programme to select, train and deploy job seekers into aged care roles
- **2pi Software**: received funding to run an IT hackathon and internship for job seekers in the Bega Valley
- **2pi Software**: received funding to develop and deploy a tech micro-credentials programme for job seekers across the entire far south coast
- **Twofold Aboriginal Corporation**: received funding to train indigenous job seekers in construction for subsequent employment locally
- **Bega Valley Shire Council**: received funding to appoint a consultant to undertake a detailed analysis and audit of skills requirements and needs across the Bega Valley.
- **Illawarra Retirement Trust**: received funding to train Indigenous job seekers in home care operations and receive a Certificate III in Individual Support.
- **Regional Development Australia Far South Coast**: received funding to conduct a research study into the transport issues facing job seekers and workers across the Shoalhaven, Eurobodalla and Bega Valley local government areas.

Source: Regional Development Australia Far South Coast (2018[47]); Employment Facilitator – Far South Coast (2020[49]); Department of Employment (2014[48]).

Box 4.11. The EU Youth Employment Initiative: targeting regions with high youth unemployment

The Youth Employment Initiative (YEI) was launched to provide support to young people living in regions where youth unemployment was higher than 25% in 2012. It is one of the main EU financial resources to support the implementation of Youth Guarantee schemes. The initiative provides direct support to young people who are not in education, employment or training (NEET), including the long-term unemployed or those not registered as job seekers. It has the objective of ensuring that in parts of Europe where labour market challenges are most acute, young people can receive targeted support. Typically, the YEI funds the provision of apprenticeships, traineeships, job placements, as well as further education leading to a qualification. The total budget of the Youth Employment Initiative is EUR 8.8 billion for the period 2014-2020. The initiative is complementary to other actions undertaken at the national level, supported in particular by the European Social Fund (ESF), aiming to implement youth guarantee schemes. The total budget of the YEI was EUR 8.8 billion for the period 2014-2020. In order to mobilise faster YEI actions on the ground, substantial funding was released to Member States in the form of pre-financing, which in 2015 was exceptionally increased to 30% of the special YEI budget line. All in all (combining EU funding on the dedicated YEI budget line, the matching funding under ESF and national co-financing), the total budget for YEI was EUR 10.4 billion.

Evaluations of the initiative have been undertaken in several EU regions, showing its beneficial impact. For example, a recent evaluation of the programme undertaken in Portugal shows that it was able to improve young individuals' labour market outcomes both in the shorter and medium term. For individuals participating to YEI interventions, 36 months after the intervention start, the probability of being employed is higher, with the effect being stronger the longer the intervention lasts, and for hiring support interventions relative to internships. On average, individuals participating in YEI activities earn between EUR 145 and EUR 313 more. A similar exercise has been conducted in France, where the YEI appears to have had an effect in reducing the long-term unemployment rate, especially for periods of one year or more, for young people in YEI-eligible regions, compared to those in the ineligible regions. The programme also had a significant effect in access to training within disadvantaged regions in France. However, the counterfactual analysis shows that youth employment is more precarious in terms of underemployment and insecure employment (fixed-term contracts, temporary contracts, assisted contracts and apprenticeships) in the YEI regions than in the non-YEI regions in France.

The European Commission has released a report outlining lessons learnt from the experience of the YEI across European regions. A first success factor identified is effective outreach to young people, with local partnerships and co-operation with youth organisations being key to the success of the initiative. The report also stresses the importance of tailoring offers to achieve long term benefits especially for youth furthest away from the labour market. Working with schools as most of the problems start before young people reach the age to qualify as NEET, as well as involving trained youth workers to help disadvantaged young people make the transition from inactivity to participating in training or employment schemes.

Source: European Commission (2020[50]; 2020[51]; 2020[52]); Thenint and Havet (2019[53]).

4.3.3. States and territories are also taking initiative in support of regional areas

Australian states and territories have also taken the lead in the development of measures to support local development in regional areas For example, New South Wales, Victoria and Queensland have established respectively a Regional Job Creation Fund, a Regional Jobs Fund and a Jobs and Regional Growth Fund in support investment attraction and job creation in regional areas.

In New South Wales, the Regional Job Creation Fund has been recently established to support regional investment and job creation by offering up to AUD 10 million in co-funding to activate or bring forward regional projects in engine, enabling or emerging sectors. The Regional Job Creation Fund's focus is to co-fund projects creating at least five sustainable regional jobs, and is part of a broader NSW government strategy to attract investment and promote local job creation (NSW Government, 2020[54]). Examples of eligible projects could include the:

- replacement, upgrade or adaptation of plant and equipment at an existing regional NSW business
- establishment of an additional production line for an existing regional NSW business
- onshoring of activity currently done overseas to a regional NSW location
- development of new regional tourism experiences and visitor attractions
- relocation of a business operation from out of state to regional NSW.

Similarly, in Victoria, the Regional Jobs Fund provides businesses and organisations with funding to develop and retain jobs in the state. The Victorian Government invests in seven high potential, high value sectors to drive Victoria's economic growth including food and fibre, advanced manufacturing, professional services, new energy technology, medical technology, life sciences and healthcare, transport, defence and construction technology, international education. Current and past programmes funded under the Regional Jobs Fund include Employment Precincts, Food Source Victoria, Horticulture Innovation Fund, Innovation and Productivity, Investment Attraction, Local Industry Fund for Transition, Market Access, Regional Skills, Wine Growth Fund (Regional Development Victoria, 2020[55]).

In Queensland, the AUD 175 million Jobs and Regional Growth Fund (JRGF) has the objective of increasing private sector investment and creating jobs. JRGF aims to assist business to grow and expand throughout regional Queensland. JRGF facilitates projects which support regional business investment and improve ongoing employment outcomes. The fund focuses primarily on regions outside South East Queensland (SEQ) however projects located in areas within SEQ may be considered on a case by case basis. The fund will provide one-off financial assistance ranging from AUD 100,000 to over AUD 10 million in either direct grants or relief of State charges (e.g., payroll tax, stamp duty). The fund will:

- support regional growth and job creation, by leveraging additional investment in the region
- assist businesses to grow and expand in Queensland
- target businesses and sectors such as agriculture, resources, tourism, manufacturing and construction (Queensland Government, 2019[56]).

Box 4.12. Success stories from the Jobs and Regional Growth Fund in Queensland

The Jobs and Regional Growth Fund is backing industry projects boosting regional economies and creating jobs. Since February 2017, the fund has attracted applications from regional Queensland businesses looking to start impactful projects. The fund has created hundreds of new jobs and is driving significant capital investment. Examples of projects funded by the Jobs and Regional Growth Fund include Australian Chocolate and the Dugalunji Aboriginal Corporation.

Australian Chocolate

Australian Chocolate, located at Mission Beach in Far North Queensland, is undertaking an expansion project that creating 31 new jobs over four years. With assistance from the Jobs and Regional Growth Fund, the company aims to construct a new facility and purchase processing equipment.

The additional equipment will allow the company to offer processing services to other cocoa growers in the region. This growth is also projected to generate an increase in demand for other locally grown products, such as pepper, vanilla, tropical fruit, which feature as part of the company's product line. Australian Chocolate is now well-positioned to drive and expand the cocoa-growing industry in Far North Queensland.

Dugalunji Aboriginal Corporation

The Dugalunji Aboriginal Corporation in Camooweal is refining its spinifex harvesting operations and developing a pilot processing facility, with support from the Jobs and Regional Growth Fund.

The project has initially created 11 Indigenous jobs. However, there may be opportunity to expand to commercial operations once the applications for spinifex are fully realised. Spinifex potentially has high-value applications in the latex, paper, plastics and rubber industries. The traditional owners have collaborated for many years with The University of Queensland to help uncover the unique properties of spinifex that has in turn led to Australia's most advanced nanocellulose technology.

The Dugalunji Aboriginal Corporation hopes that the project's success will allow it to act as a model that can be replicated across remote and regional areas enabling other Indigenous communities to benefit from the harvesting and processing of spinifex.

Source: Queensland Government (2020[57]).

4.3.4. There is an opportunity to connect workers to key sectors in Australia

States and territories across Australia are working to connect workers to sectors in expansion. For example, the New South Wales Government is delivering a large transport infrastructure programme, amounting to about AUD 41.4 billion of investment for major projects. The state's population is set to grow to more than 12 million people by 2056, and the NSW Government is prioritising infrastructure investment to ensure a transport network that can safely, efficiently and reliably move people and goods around the state. The government has now developed the Future Transport Strategy 2056. It is the first plan of its kind to look at how to use new technology and innovation across transport system to transform the customer experience, improve communities and boost our economic performance. The government is completing business cases for a number of high-priority projects that will help future-proof Sydney's transport to meet population and growth challenges – such as the Western Harbour Tunnel and Beaches Link, Stage 1 of the F6 Extension, Sydney Metro West, and the north-south rail link in Western Sydney (New South Wales Government, 2018[58]). Going forward, the Western Sydney Airport represents another opportunity for local job creation in New South Wales (see Box 4.13).

Box 4.13. Local job creation opportunities from the New Western Sydney Airport

Western Sydney is one of the fastest growing regions in Australia and will continue to grow rapidly. With a population of around two million, Western Sydney would be Australia's fourth largest city in its own right. It is home to NSW's two fastest growing areas – Bringelly and North Blacktown. This growth is expected to continue, with 65% of Sydney's population growth in the next 20 years expected to take place in Western Sydney. Infrastructure needs to be planned and built to meet the needs of the growing population. But while Western Sydney is growing and emerging as a major economic region, the Western Sydney jobs gap continues to slide. The region is experiencing a jobs shortage where over 300 000 people commute outside Western Sydney for work each day, meaning there are not enough jobs for the number of workers who live in Western Sydney. If things remain the same, this is predicted to grow to a jobs shortage of over 300 000 and around 490 000 people leaving the region daily in the next 20 years.

Western Sydney Airport will be built on around 1,780 hectares of land at Badgerys Creek. Construction has already commenced on site with the airport on track to open in 2026. Stage 1 of the airport will have one 3.7 kilometre runway. It will be able to handle the full range of aircraft, including code F aircraft such as the Airbus A380. The airport will grow over time as passenger demand increases. This will include staged expansion to the terminal and other facilities and building a second parallel runway (expected to be required around 2050). As demand for air travel continues to grow, Western Sydney Airport will cater for more than 80 million passengers a year in the long term.

Western Sydney Airport will be a major source of direct employment for thousands of Western Sydney residents in a number of new sectors in the region. The Western Sydney Airport project comes at a time when the Western Sydney economy faces a transition. Although manufacturing in Western Sydney is following national trends and is declining, the sector has traditionally been one of the region's biggest employment sectors. This trend is set to change as construction ramps up on the airport site. The total jobs needed during the construction phase is expected to be 11 346. Initially, the biggest need for jobs at Western Sydney Airport will be in construction, supporting over 4 400 direct and indirect jobs. Manufacturing (around 1 200 jobs) and retail (around 1 050 jobs) will continue to be significant employers at the airport and will support construction efforts and workers on site, as will the professional, administrative, transport and warehousing, and financial sectors (around 2 100 jobs combined).

Source: Australian Government (2017[59])

Box 4.14. Supporting COVID-19 hard-hit industries in Canada

The Canadian Government announced in November 2020 a CAD 1.5 billion in job-training support to the provinces and territories to help Canadians in industries hit hard by the COVID-19 pandemic. The funding will target laid-off workers in sectors including construction, transportation and hospitality, helping them re-enter the workforce by bolstering access to skills training and employment services. The funding comes on top of the CAD 3.4 billion the government is transferring to the provinces and territories in 2020-21 under workforce and labour market development agreements.

The new support measure has been unveiled at a critical time for the Canadian economy. A new survey from Statistics Canada, Canada's national statistical office, found nearly one-third of businesses do not know how long they can keep going under existing conditions brought by the second wave of COVID-19. In addition, nearly 40% of businesses have laid off staff since March and nearly one in five report they will be compelled to take drastic action in less than six months if cash flow does not improve. Meanwhile the unemployment context barely improved in October, with unemployment rates sitting at 8.9% compared with 9.0% in September, leaving some 1.8 million people out of work.

Source: Reyonds (2020[60])

NSW has introduced the Infrastructure Skills Legacy Program (ISLP), to ensure workers develop the skills needed for local jobs in infrastructure. The programme will capitalise on the NSW Government's record levels of infrastructure investment to boost the number of skilled construction workers and create fresh pathways to employment across the state. The NSW Government has consulted with the construction industry in establishing the ISLP's training and employment targets, which will allow existing workers to learn new skills on the job; increase the representation of young people, Aboriginal and Torres Strait Islander people and women in the construction industry; ensure workers from surrounding areas are targeted for training and employment to help address existing skills shortages across NSW (New South Wales Government, 2017[61]).

Similarly, the Victoria Government has established the Skills First programme to provide skilled workers needed in six sectors identified for major growth. These include: medical technology and pharmaceuticals, new energy technology, food and fibre, transport, defence and construction technology, international education and professional services. The Government will continue to invest AUD 1.2 billion annually in the training and workforce development of Victorians. Under Skills First, there will be even stronger links between training and industry. The Workforce Training Innovation Fund will foster partnerships between industry, TAFEs and other training providers to work together to drive innovative collaboration through new qualifications, approaches to the delivery of training and curriculum development. Initial funding of AUD 40 million will be provided for 2017 (Victoria State Government, 2016[62]).

As COVID-19 is having an uneven impact, depending on the sectoral composition of local economies, there is also an opportunity for Australia to provide targeted support to specific states/territories and sectors. The Australian Government has established AUD 1 billion to support communities, regions and industries most significantly affected by the pandemic. These funds have the objective of assisting businesses during the outbreak and helping with the recovery. The initiatives announced under the Fund are supporting industries including aviation, agriculture, fisheries, tourism and the arts (Department of Infrastructure, Transport, Regional Development and Communications, 2020[63]). The government has introduced the Harvest Relocation Assistance programme, providing support for people to move and take up jobs in agriculture, including harvest work, from 1 November 2020 to 31 December 2021. As part of the programme, eligible workers receive financial assistance to help with the costs of travel and accommodation when relocating to take up a short-term agricultural work opportunity

(Australian Government, 2020[64]). The Australian Government could also look to examples from other OECD countries, such as Canada, in supporting hard-hit sectors and places (see Box 4.14).

4.3.5. Australia could also facilitate transitions towards sectors facing a lower risk of automation

Across the OECD, there is renewed interest in the role of industrial policy to strengthen relevant sectors of the local economy. The tradable sector, including those economic sectors producing goods or services that can be traded, such as Mining, Industry, Information and Communication, Financial and Insurance activities, is recognised as a driver of productivity growth. However, jobs in this sector, typically face a higher risk of automation, as they tend to entail routine and repetitive tasks. This is mostly due to the fact that the tradable sector includes many sectors that have an especially high risk of automation, such as agriculture and manufacturing. On the other hand, tradable services, which form a small but growing part of the tradable sector, are likely at a lower risk of automation. Policy makers can support shifts towards the tradable sector as productivity growth can lead to better wages and standards of living, while addressing the risks related to automation stemming from this shift. Policies can look within the tradable sector to identify how to steer support towards jobs that are less vulnerable to automation. Given that industrial and skills development policies often pertain to different government departments, policy co-ordination is crucial (OECD, 2020[21]).

Local skills ecosystems can be instrumental in providing access to relevant specialised knowledge and skills (OECD, 2018[8]). Local skills ecosystems have a high level of social capital and strong multi-sector linkages between employment services, training organisations, as well as economic development actors, providing local firms with access to specialised support to innovate into new activities. Local skills ecosystems can emerge organically or in some cases governments can play a role in providing incentives for their development. The establishment of a local skills ecosystem often depends on a strong anchor institution, such as a higher education or vocational education institution, as well as a driver of change (including for example evidence that the region is likely to experience significant adjustment due to automation).

Policies in Australia could build on local skills ecosystems to promote diversification into activities closely related and connected to the existing skills base of the population. As communities respond to structural adjustments in light of automation, local networks connecting industries with overlapping skill requirements are predictive of where firms are most likely to diversify their activities. Successful examples of this diversification approach can be found in many communities across OECD countries. For example, in Akron, Ohio, United States, which was the location of four major tire companies in the 1990s. After experiencing major economic and jobs decline in this sector, the city invested in polymer technology, establishing a National Polymer Innovation Centre, which has since been a new source of job creation in the city. The city has managed to leverage the existing skills base and local knowledge and applied it to new technology and production processes. “Smart Specialisation” strategies within Europe could also provide useful examples, as they generally aim to focus local development activities in areas where there is a critical mass of knowledge and innovation potential. Similarly, the Basque Country (Spain) has taken action to prepare local industries transition to the future of work (see Box 4.16).

Box 4.15. Promoting transitions in the Geelong region (Victoria)

The Geelong regional area is the largest regional economy in Victoria. The area comprises the local government areas of the City of Greater Geelong, Surf Coast and Colac Otway to the south-west, Golden Plains to the north-west and Queenscliff on the Bellarine Peninsula. The region produces over AUD 10 billion annually in Gross Regional Product. It is also a more diverse industry base than the rest of regional Victoria, and has a population of about 300 000 people.

Over recent years, Geelong has faced employment challenges as the city is transitioning from its traditional manufacturing base to a more service-based economy. This transition has corresponded with a general context of low economic growth across Victoria. While a net rebalancing or slight growth in employment levels might appear satisfactory, the policy objective should be to pursue highest productivity jobs which create a higher quality of life and more value for the community, and ultimately for the national economy as well. Geelong has important local assets, such as well-respected education and research institutions, an international seaport and airport and expertise in areas of Asia region high demand, such as agriculture and advanced materials.

Work undertaken by the Deakin University, in partnership with the City of Greater Geelong and the G21 Geelong Regional Alliance, a local alliance of government, business and community organisations, has identified future opportunities for sustainable growth and job creation in the region going forward. The project started in 2016 and throughout the research phase, the authors have consulted with regional practitioners, international experts and market investment parties. The project has led to the identification of five opportunities for future growth and job creation in the region. For each project, the research identifies the type of investment needed as well as the potential impact on direct job creation and long-term employment. The identified projects include:

- Irrigated agriculture using secure recycled water supplies: High-security, low-cost water infrastructure to drive an expanded, higher-profile Geelong farming sector;
- Australian Animal Health Laboratory (AAHL) Geelong: Asia's future collaborative hub for infectious disease and biosecurity preparedness and research;
- Avalon: Victoria's future inland freight precinct: Dominant road/rail freight transports and handling precinct for Victoria and its major seaports;
- Industrial-scale advanced carbon fibre manufacturing in Geelong: Geelong as home to the world's leading non-aerospace carbon fibre industrial scale manufacturing plant;
- Commercialised international education in farming and agribusiness.

The Geelong City Deal is a 10 year plan to revitalise Geelong and unlock the potential the potential of the Great Ocean Road tourism economy through various infrastructure projects. The Australian and Victorian governments, along with the City of Greater Geelong, will deliver around AUD 382 million in investment to the region to support Geelong's continued economic diversification, growth of the tourism sector and a thriving city centre.

Source: Deakin University (2017[65]); Department of Infrastructure, Transport, Regional Development and Communications (2021[66])

Box 4.16. Preparing industries for the future of work in the Basque Country (Spain)

In 2019, the United Nations Industrial Development Organisation (UNIDO) selected the Basque Country's "Industry 4.0" industrial strategy as a best practice. "Industry 4.0" is defined by UNIDO as a process in which "the physical world of industrial production merges with the digital world of information technology – in other words, the creation of a digitized and interconnected industrial production, also known as cyber-physical systems". Several countries and regions across the OECD have adopted Industry 4.0 strategies as part of their industrial policy over recent years, including Germany, Italy, France and the United Kingdom.

The Basque Industry 4.0 strategy aims to promote the incorporation of intelligent systems into production plants, improve the use of emerging technologies in products and processes, and to integrate advanced materials into higher added-value solutions and processes in a sustainable way. The mission of the strategy is to strengthen the position of the Basque Country as an economy with an industrial base through the promotion of knowledge intensive manufacturing. The strategy has five strategic objectives:

- Added Value: To help and guide Basque companies towards more knowledge intensive manufacturing activities which have greater added value;
- Integration of KETs: To promote multi-disciplinary and technological convergence in a structured way so as to develop best-in-class manufacturing capacities and solutions while optimizing existing resources;
- Global value chains– Cluster 2.0: To integrate local and international value chains international value chains to meet the challenges of Advanced Manufacturing using the sum of the particular capacities of each sector and its companies;
- Scaling Up: To foster collaboration and support as a catalyst for the industrialization of the results of R+D+i in Advanced Manufacturing;
- Talent: To support education and job training in technologies and management systems related to Advanced Manufacturing.

The strategy was created as part of the Basque Government's 2017-2020 industrial policy, with the objective of creating positive conditions for the industrial ecosystem and maintaining industry as a central part of the regional economic and social model. In practice, the strategy involves programmes such as BIND 4.0, a public-private start-up incubator that links entrepreneurs with Basque firms. The plan will also assist SMEs in technological training in new manufacturing methods. The strategy came at a time when industrial employment seemed at risk, as the economic crisis had a particularly noted impact on industrial jobs. The Basque Government aims to restore industry's share in the region's economy to 25%, and sees industrial development as a means to reduce unemployment, consolidate recovery, raise social cohesion and lift the region's GDP per capita to 125% of the EU average.

Source: OECD (2020[67]); European Commission (2018[68]); European Parliament (2015[69]).

4.4. Supporting firms in a changing world of work

4.4.1. The Australian Government has provided key support to SMEs during COVID-19

Small and Medium-sized Enterprises (SMEs) represent the backbone of the Australian economy. According to the Australian Bureau of Statistics, as at June 2020, there were 2 422 404 actively trading businesses in the Australian economy, mainly operating in the Construction, Transport, postal and warehousing and Professional, scientific and technical services sectors, Health Care and Social Assistance (Australian Bureau of Statistics, 2020[70]). Despite the impact of the pandemic on businesses, this represents a 2% increase compared to June 2019, when there were 2 375 753 actively trading businesses in Australia (Australian Bureau of Statistics, 2020[70]). SMEs account for about 99.8% of all businesses in Australia, slightly higher than on average across the OECD (OECD, 2020[71]).

SMEs have been hit harder than larger firms by the COVID-19 pandemic. The COVID-19 crisis has heightened the importance of SME digitalisation, and served as an accelerator. Firms have moved operations online and implemented smart working solutions to remain in business during lockdowns and overcome disruptions in supply chains, with online platforms playing an instrumental role in connecting users to new markets, suppliers or resources (OECD, 2021[72]). OECD work shows that this is due to both supply and demand factors. On the supply side, firms have experienced a reduction in the supply of labour, as workers have been unwell or have needed to look after children and other dependents while movements of people are restricted. Measures to contain the disease by lockdowns and quarantines have led to further and more severe drops in capacity utilisation. On the demand side, a dramatic and sudden loss of demand and revenue for SMEs severely affects their ability to function, and/or causes severe liquidity shortages. Furthermore, consumers experience loss of income, fear of contagion and heightened uncertainty, which in turn reduces spending and consumption (OECD, 2020[73]). In the Australian context, the particular difficulties for small businesses in the face of COVID-19 have emerged from a number of surveys. Around 70% of all businesses surveyed by the Australian Bureau of Statistics (ABS) in mid June reported a decline in revenue relative to the same time last year. Small businesses were twice as likely to record a large decline in revenue as large businesses. Likewise, smaller retailers have seen a sharp decline in sales while larger retailers overall have seen stronger growth in their sales (Lewis and Liu, 2020[74]). In addition, small businesses expectations throughout COVID-19 have been severely impacted. A survey released in June 2020 by American Express found that 80% of small business owners expressed optimism about their survival prospects through the pandemic in Australia, but 52% feared that sales will not bounce back strong enough to survive in the longer term (American Express, 2020[75]). Another survey conducted by KPMG found that 79% of companies were confident their organisation would be able to rebound financially. However, a third survey (Prushka's Canary in the Coal Mine report) gives a gloomier outlook on entrepreneurs' confidence and expectations with only 22% of SMEs being confident in their business in May 2020 as compared to 40% a year before.

Acknowledging the importance of SMEs for the economy and their specific challenges during COVID-19, the Australian Government has taken immediate action to provide them with targeted support. For example, by establishing the Coronavirus Small and Medium Enterprises Guarantee Scheme, which is supporting up to AUD 40 billion of lending to SMEs (including sole traders and not-for-profits) and guaranteeing 50% of new loans issued by participating lenders to SMEs. The Scheme is enhancing lenders' ability to provide cheaper credit, allowing many otherwise viable SMEs to access vital additional funding to get through the impact of Coronavirus, recover and invest for the future (The Treasury, 2020[76]). In addition, debt repayment holidays provided by financial institutions have supported SMEs throughout the pandemic in Australia. COVID-19 has induced the government in Australia as in many advanced economies to temporarily halt bankruptcy procedures, providing lifelines to keep firms alive through the crisis, at a time when premature bankruptcy can worsen the recession. Data for 2020 show

that bankruptcy filings decreased by about 40% in Australia. Australia returned to normal bankruptcy procedures on 1 January 2021 (Djankov and Zhang, 2021[77]). Box 4.17 presents the wide range of measures introduced by the Australian Government to support SMEs since the beginning of the pandemic.

Box 4.17. Australian Government's measures in support of SMEs during COVID-19

In March 2020, the Australian Government announced an economic package of AUD 17.6 billion to support workers and firms during the pandemic. SMEs-directed measures revolved around delivering support for business investment and supporting businesses with cash flows.

Delivering support for business investment

- The Government has increased the instant asset write-off threshold from AUD 30 000 to AUD 150 000 and expanding access to include businesses with aggregated annual turnover of less than AUD 500 million (up from AUD 50 million) until 30 June 2020. In 2017-18 there were more than 360 000 businesses that benefited from the current instant asset write-off, claiming deductions to the value of over AUD 4 billion.
- Backing business investment: The Government is introducing a time limited 15-month investment incentive (through to 30 June 2021) to support business investment and economic growth over the short term, by accelerating depreciation deductions. Businesses with a turnover of less than AUD 500 million will be able to deduct 50 per cent of the cost of an eligible asset on installation, with existing depreciation rules applying to the balance of the assets' cost.

Boosting cash flows

- The Boosting Cash Flow for Employers measure will provide up to AUD 25 000 back to small and medium sized businesses, with a minimum payment of AUD 2 000 for eligible businesses. The payment will provide cash flow support to businesses with a turnover of less than AUD 50 million that employ staff. The payment will be tax free. This measure will benefit around 690 000 businesses employing around 7.8 million people.
- Supporting apprentices and trainees: the government is supporting small business to retain their apprentices and trainees. Eligible employers can apply for a wage subsidy of 50 per cent of the apprentice's or trainee's wages paid between 1 January 2020 and 31 March 2021. Where a small business is not able to retain an apprentice, the subsidy will be available to a new employer that employs that apprentice. This measure will support up to 70 000 small and medium businesses, employing around 117 000 apprentices.

On 22 March, the Government announced a second additional package of AUD 66 billion. The package includes a tax free cash payment of up to AUD 100 000, available to businesses with turnovers below AUD 50 million and also to eligible not-for-profit charities, as well as a new Coronavirus SME Guarantee Scheme. Under a plan put forward by the banking industry, businesses with up to AUD 10 million in total loan facilities will be able to defer their loan repayments for six months.

In the following months, the Australian Government has continued introducing measures in support of SMEs. These included temporary changes to the bankruptcy law, a new wage subsidy plan, as well as measures to reduce the power bill for SMEs. At the beginning of June, the government announced the extension of the business support measures. In July, media reported on plans of the government for a further AUD 10 billion support plan for companies aimed at recovery

Source: Prime Minister of Australia (2020[78]); OECD (2020[73])

4.4.2. Training incentives can help SMEs access skills development opportunities

SMEs typically offer fewer opportunities for employee skills development. Targeted incentives can play an important role in favouring the participation of employers in the vocational education and training system (OECD/ILO, 2017[79]). Given the constraints faced by smaller firms in accessing training, incentives can be even more effective in the context of SMEs. Across the OECD, employees in small firms are 50% less likely to be offered formal training than those in larger firms (OECD, 2013[80]). This is generally due to the lack of dedicated internal training or Human Resources departments to organise and co-ordinate training. In addition, SMEs often have lower levels of management skills and practices, suggesting that even when employee skills are developed, these may not be used effectively. Direct financial costs for developing tailored training are another typical constraint for SME training. Large firms can distribute the fixed training costs over a larger group of employees than SMEs (OECD, 2019[81]). Within Australia, adults working in micro and small enterprises are less likely to participate in training than those working in medium-sized firms (56.1%, 64.4% and 75.4% respectively), although those least likely to participate in training are adults working in large firms (45.9%). COVID-19 is likely to cause SMEs to step up their digitalisation efforts in order to increase efficiency and competitiveness (OECD, 2021[72]).

The Australian Government has programmes in place providing support to firms in staff development and training. It can be challenging for small and medium-sized firms to have sufficient capacity and resources to participate in apprenticeship programmes (OECD, 2019[43]). The Australian Government has a dedicated webpage, providing information on available support and incentives. For example, the Australian Apprenticeships Incentives Program (AAIP) contains a range of direct payments to support employers in providing apprenticeship opportunities. The AAIP was scheduled to be replaced with a new and streamlined incentives programme for employers of apprentices and trainees, the Incentives for Australian Apprenticeships (IAA). However, due to COVID-19, the government has postponed its adoption to July 2021. In light of the pandemic, the government has also introduced the Boosting Apprenticeship Commencements measure, supporting firms to take on new apprentices and trainees. Under this measure employers who engage an Australian Apprentice between 5 October 2020 and 30 September 2021 may be eligible for a subsidy of 50% of wages paid to an apprentice for a period of 12 months from the date of commencement, to a maximum of AUD 7 000 per quarter. In addition, the Support for Adult Australian Apprentices (SAAA) incentive is a payment of AUD 4 000 to an eligible employer of an adult Australian Apprentice once the apprentice has successfully completed 12 months of training. The purpose of the SAAA incentive is to remove barriers to taking up an apprenticeship for adult Australian Apprentices and to encourage them to build on their skills.

Recent OECD work on financial incentives for adult learning recommends that Australia adjust the design of its financial incentives to address identified weaknesses. In particular, the report stresses that Australia could allow use of existing subsidies and loans for less time-consuming types of training (e.g. modular, distance, online, etc.), and broaden the eligibility of the self-education tax deduction to training unrelated to one's current employment. Paid education and training leave could also be added to the existing set of incentives to address time barriers, and employers could be compensated for lost wages during paid training, or provided with replacement workers through a job rotation scheme. Better targeting of existing incentives would mitigate deadweight loss (OECD, 2019[31])**.**

Australia could also look to other OECD countries that have recently introduced measures to support firms in employee training. For example, in 2013 the Government of Canada introduced the Canada Job Grant (CJG), a funding programme designed to reduce the costs of providing third-party skills training to new and existing employees. The grant enables individuals to receive support of CAD 15 000 or more in training services, funded by the federal government and the individual employer (Government of Canada, 2013[82]). Lithuania introduced a competence training voucher, supporting both small and large firms in employee training, and helping workers adapt to changing skills in the labour market. Box 4.18 provides more information about the Canada Job Grant and the Lithuanian Competence Training Voucher.

Box 4.18. Incentives for SME training: examples from Canada and Lithuania

The Canada Job Grant

In 2013, the Government of Canada introduced the Canada Job Grant Program (COJG), supporting employers, individually or in groups, to invest in their workforce. The programme provides direct financial support to individual employers or employer consortia who wish to purchase training for their employees. It is available to small, medium and large businesses with a plan to deliver short-term training to existing and new employees. A review of the Canada Job Grant undertaken in the second year of existence of the programme (2016) had found that the programme was generally meeting the needs of employers across the country, but results could be improved in terms of increasing labour market attachment and the overall employment situation of participants.

The Competence Training Voucher in Lithuania

In March 2017, the Ministry of Economy in Lithuania introduced competence vouchers to support firms in employee training and adapt to a changing labour market. Enterprises are granted EUR 4 500, to be used within 12 months to purchase employee training. Vouchers can be used towards 80% of the training costs for micro and small and medium enterprises and 70% for large enterprises

Enterprises from different sectors of industry can invest in their employee training, through specialised certified training programmes or other training courses, to acquire relevant skills that they are currently lacking, including professional foreign language, financial management, export, strategic planning, conflict resolution, stress management, communication, motivation, time planning. The programme is operated with support from the European Social Fund.

Source: (2019[81]; 2020[21]); CEDEFOP (2018[83]).

4.4.3. Employer-led networks can be effective to boost SME skills development

Countries aim to raise awareness of the importance of training and skills development in SMEs through various channels, including public and stakeholder organisations. An option for awareness raising is to leverage local employer networks to promote skills upgrading in the workplace. Employer networks and associations can also foster trust-based relationships between firms that support knowledge-sharing and pooled investments in training. Collaborations across firms can also foster innovative diffusion within regional supply chains, potentially integrating firms into GVCs, which also reduces regional vulnerability to automation.

In Australia, Group Training Organisations (GTOs) are corporations employing apprentices and trainees under contracts of training with the various state and territory governments and placing them with host employers. GTOs are the legal employers of the apprentices or trainees and are responsible for selecting and recruiting them, identifying and matching them to host businesses, meeting employer obligations, including paying wages and entitlements, arranging formal training and assessment, and providing pastoral care and support throughout the engagement. GTOs in Australia have proved particularly helpful to SMEs that find committing to an apprenticeship difficult, lack the resources to manage an apprentice, or are unable to provide the full on the job training required for an apprenticeship.

Another approach to skills development for SMEs is the creation of networks of businesses within the same sector or partnerships to help firms navigate labour market changes and get easier access to skills development information and opportunities. A notable example is Skillnet Ireland,

which has been particularly successful in creating networks (especially among SMEs) for businesses within the same sector of operation or geographical region, to come together and develop targeted skills development solutions. In Korea, the SME Training consortium National Human Resources Development Consortium has played a key role in fostering SME training access (see Box 4.19).

Box 4.19. Employer-led networks for skills development: examples from Ireland and Korea

Skillnet Ireland

Skillnet Ireland supports over 16 500 companies nationwide. About 56% of these are micro-enterprises, 26% are small enterprises and 13% are medium enterprises and 5% are large companies. Skillnet Ireland provides a wide range of valuable learning experiences to over 50 000 trainees. Skillnet encourages firms to lead the process for training to ensure that programmes delivered are highly relevant to industry needs. Training and up-skilling significantly enhances the career mobility of the workforce. Training is open to management and employees of companies who become members of a Skillnet Network. Skillnet allocates funding to Learning Networks, which are groups of companies within the same industry sector (Single Sector Networks) or region (Multi Sector Networks) with similar training needs, so they can receive subsidised training. With 70 distinct Networks nationwide, businesses can find a Network that has experience in a particular area of interest and understands specific business needs. Networks offer a flexible approach to suit specific business needs: they work with businesses to source and part-fund training partners to provide relevant up-skilling.

National Human Resources Development Consortium in Korea

Under the National Human Resources Development Consortium programme, launched in 2000, large firms, employers' associations and universities establish joint training centres, which conduct consortium projects to provide customised training for workers in SMEs. In August 2018, a total of 216 joint training centres had been set up, and participating institutions were evenly distributed between large firms, employers' association and universities.

The National HRD Consortium has made a significant contribution to increasing SME participation in vocational training in Korea. As of 2018, 124 230 of SMEs and 252 159 workers had benefited from this programme. The programme accounted for 25% of the total government spending on vocational training for incumbent workers.

Source: OECD (2019[84]; 2020[85]); Skillnet Ireland (2020[86]).

4.4.4. Measuring skills needs is crucial to support SMEs in the future of work

Both large firms and SMEs often face challenges in accessing the skills needed for the job. The Manpower Talent Shortage Survey shows that one quarter of Australian employers say the main reason they cannot fill roles is a lack of applicants. Another 19% say candidates lack the necessary experience (ManpowerGroup, 2018[87]). As COVID-19 and trends related to the future of work are changing the type of skills needed in the labour market and the future, it becomes even more crucial for policy makers to gather data and evidence on employers' skills needs and training initiatives, to develop evidence-based policies aiming to foster skills development and employer-led training.

The National Skills Commission undertakes skill shortage research on an ongoing basis. The research is part of a programme which began more than three decades ago. The methodology is applied consistently across occupations and locations to provide information about employers' ability to recruit the skilled workers they need. A key element of the skill shortage research is the Survey of Employers who

have Recently Advertised (SERA). The SERA is a telephone-based survey of employers who have recently advertised vacancies in selected skilled occupations to determine their experiences recruiting. The SERA collects two kinds of information about employers' experiences recruiting skilled workers.

- Qualitative information from discussions with employers and recruitment professionals, enabling the identification of key labour market issues for each occupation.
- Quantitative data about employers' recruitment experiences, including the proportion of vacancies filled and the number of applicants, qualified applicants and suitable applicants. This provides the basis for historical comparisons and analysis across states/territories and occupations.

Taking account of all available information, including the results of the SERA and the reasons for employers being unable to fill vacancies, along with a range of other statistical information and stakeholder consultation, the Commission assigns an appropriate rating for each occupation. Ratings include: no shortage, shortage, recruitment difficulty, cannot rate and no rating. The rating for an occupation is based on the labour market for an average experienced worker rather than a new entrant. Depending on the data available, ratings are for the whole of the state or territory (or for Australia if it is a national assessment) unless there is evidence suggesting the rating varies between metropolitan and regional locations (Australian Government Department of Education, Skills and Employment, 2020[88]).

The National Skills Commission is conducting an ongoing survey of employers to monitor recruitment activity in the labour market (the Recruitment Experiences and Outlook Survey). The current iteration of the survey commenced on 21 September 2020, with data collected on a range of topics including current and recent recruitment activity, recruitment difficulty, recruitment methods, and future staffing expectations. Approximately 1 200 employers are surveyed each month, with data published in the weekly Recruitment Experiences and Outlook Snapshot on the Labour Market Information Portal (www.lmip.gov.au).

4.4.5. SMEs are making the digital transition in Australia

Digital technologies represent an opportunity for small firms, both in commercial and work-life balance terms. For example, a small business can use a point of sale system, an accounting software package, a customer relationship management system, and a variety of phone apps, to grow their revenue and increase their return on investment. Going digital can enable a business owner to work anywhere and anytime, to spend more time with family, and to protect the value of the business. Yet, many Australian small businesses are delaying, ignoring, or simply unaware of digital opportunities, and failing to realise the economic and lifestyle advantages that digital tools clearly offer (Department of Industry, Science, Energy and Resources, 2018[89]).

The Australian Government established a Small Business Digital Taskforce in 2017, with the objective of increasing awareness among Australian small businesses of the value in using digital technology. The Taskforce approached this task from two complementary perspectives: a user-centred approach focusing on the mindset and views of small business owners who have struggled, and who have succeeded, in going digital; and a system-level approach, highlighting the shortcomings of the current ecosystem that coordinates the digital advice that small businesses receive. The taskforce developed a set of recommendations for the government to increase the digital technology up-take by small firms (Department of Industry, Science, Energy and Resources, 2018[89]). In 2018, the Government consulted with representatives from technology companies, financial institutions, small business and industry associations, and federal, state and territory governments on each Taskforce recommendation, expressing support for the majority of recommendations. Specifically, the government expressed support for the taskforce's primary recommendation to establish a new independent body to co-ordinate digital information and advice for small businesses, lift their digital capability and help them to grow (Department of Industry, Science, Energy and Resources, 2018[90]).

COVID-19 has made digital technologies more important than ever for small firms to continue their day-to-day business. SMEs may have less resilience and flexibility in dealing with the costs the pandemic shock entails. Costs for prevention as well as requested changes in work processes, such as the shift to teleworking, may be relatively higher for SMEs given their smaller size. In addition, SMEs typically have lower levels of digitalisation than larger firms and face difficulties in accessing and adopting technologies. As COVID-19 has led to a halt in production, the costs of under-utilised labour and capital weigh greater on SMEs than larger firms. Furthermore, SMEs may find it harder to obtain information not only on measures to halt the spread of the virus, but also on possible business strategies to lighten the shock, and government initiatives available to provide support (OECD, 2020[73]).

In light of the pandemic, the Australian Government has introduced new measures to promote the up-take of digital technologies by SMEs, providing information and free tools to support remote working. For example, the government has set up the Australian Business Continuity website, which provides information on remote communications, collaboration tools, workforce management, and video conferencing. The government also provides information to firms on the opportunities to go digital during the pandemic, outlining processes and steps for buying and selling online, setting up a website, registering a business website and marketing businesses on social media. In addition, two government initiatives have been introduced to help businesses go digital. Specifically, the Australian Small Business Advisory Services (ASBAS) Digital Solutions offers small businesses low cost, high quality advice on a range of digital solutions to meet their business needs. They provide low-cost advice on creating a website, selling online, social media and digital marketing, using small business software, online security and data privacy. Prior to the pandemic, the Small Business Digital Champions Project had provided 100 small businesses with funding to digitally transform their business (see Box 4.20). Through funding under the Small Business Digital Champions Project, 15 Australian Industry Associations will be providing digital advisory services to their members. They will provide sector specific advice, free of charge, and demonstrate the benefits of going digital to their members.

Box 4.20. Small Business Digital Champions

Launched in 2018, Small Business Digital Champions provided 100 small businesses with support for a comprehensive digital transformation of their business. They received up to AUD 18 500 in digital support, and additional products and services from corporate partners. About 15 of the 100 businesses were selected to become Digital Champions and received additional support from a high-profile digital mentor. Digital mentors have shared their experiences and provided guidance and insight on how to get the most out of the digital transformation. The digital transformation included an assessment of the business' needs, development of a personalised digital transformation plan and digital assistance that included: hardware, software, online content development, and digital training. The Australian Government gathers case study information about the Digital Champions on a website to showcase the digital transformation of the participating small businesses and how digital technology can improve the efficiency of SMEs.

Source: Australian Government (2020[91]).

References

American Express (2020), *Optimism Returning to Small Businesses in Australia, but Fears of a Slow Rebound Persist*, https://about.americanexpress.com/all-news/news-details/2020/Optimism-Returning-to-Small-Businesses-in-Australia-but-Fears-of-a-Slow-Rebound-Persist/?linknav=au-en-au-ss-lp-mediarelease (accessed on 11 May 2020). [75]

Australian Bureau of Statistics (2021), *Counts of Australian Businesses, including Entries and Exits*, https://www.abs.gov.au/statistics/economy/business-indicators/counts-australian-businesses-including-entries-and-exits/latest-release. [101]

Australian Bureau of Statistics (2021), *Mining*, https://lmip.gov.au/default.aspx?LMIP/GainInsights/IndustryInformation/Mining. [40]

Australian Bureau of Statistics (2021), *Online sales, December 2020 - Supplementary COVID-19 analysis*, https://www.abs.gov.au/articles/online-sales-december-2020-supplementary-covid-19-analysis. [17]

Australian Bureau of Statistics (2020), *Counts of Australian Businesses, including Entries and Exits*, https://www.abs.gov.au/statistics/economy/business-indicators/counts-australian-businesses-including-entries-and-exits/latest-release. [70]

Australian Centre of Excellence for Local Government (2013), *Future-Proofing Local Government: National Workforce Strategy 2013–2020*, https://opus.lib.uts.edu.au/bitstream/10453/42140/3/Future-Proofing-LG-National-Workforce-Strategy.pdf. [19]

Australian Government (2020), *Australian Apprenticeships Incentives Program Summary*, https://www.australianapprenticeships.gov.au/sites/default/files/2020-10/AAIP%20summary%20update%2020201020.pdf. [98]

Australian Government (2020), *Budget 2020-21*, https://budget.gov.au/2020-21/content/overview.htm. [4]

Australian Government (2020), *Employer Incentives*, https://www.australianapprenticeships.gov.au/aus-employer-incentives. [94]

Australian Government (2020), *Funding and support for small business digital transformation*, https://business.gov.au/grants-and-programs/digital-champions/small-business-digital-champions. [91]

Australian Government (2020), *Funding to employ apprentices*, https://business.gov.au/Grants-and-Programs/Australian-Apprenticeships-Incentives-Program#:~:text=The%20Australian%20Apprenticeships%20Incentives%20Program%20provides%3A,or%20retain%20an%20Australian%20apprenticeship. [99]

Australian Government (2020), *Relocation Assistance*, https://jobsearch.gov.au/harvest/workers/relocation-assistance. [64]

Australian Government (2019), *Submission to the Senate Inquiry into Jobs for the Future in Regional Areas*, https://www.aph.gov.au/DocumentStore.ashx?id=4f35cab8-43cc-4c7f-b38b-ab8c98ff335f&subId=670613. [46]

Australian Government (2017), *Jobs for Western Sydney: Building Western Sydney Airport*, https://www.westernsydneyairport.gov.au/sites/default/files/booklet-jobs_for_western_sydney.pdf. [59]

Australian Government Department of Education, Skills and Employment (2020), *About the skills sector*, https://www.employment.gov.au/about-skills-sector. [36]

Australian Government Department of Education, Skills and Employment (2020), *Delivering Skills for Today and Tomorrow*, https://www.employment.gov.au/delivering-skills-today-and-tomorrow. [29]

Australian Government Department of Education, Skills and Employment (2020), *JobTrainer Fund*, https://www.dese.gov.au/jobtrainer-fund#:~:text=The%20Australian%20Government%20has%20partnered,from%20state%20and%20territory%20governments. [3]

Australian Government Department of Education, Skills and Employment (2020), *National Agreement for Skills and Workforce Development*, https://www.employment.gov.au/national-agreement-skills-and-workforce-development. [102]

Australian Government Department of Education, Skills and Employment (2020), *New Employment Services Model*, https://www.employment.gov.au/new-employment-services-model. [27]

Australian Government Department of Education, Skills and Employment (2020), *Occupational skill shortages information*, https://www.employment.gov.au/occupational-skill-shortages-information. [88]

Australian Government Department of Education, Skills and Employment (2020), *Regional Employment Trials Program*, https://www.employment.gov.au/regional-employment-trials-program. [45]

Australian Government Department of Education, Skills and Employment (2020), *Skilling Australians Fund*, https://www.employment.gov.au/skilling-australians-fund. [34]

Australian Government Department of Education, Skills and Employment (2020), *Skills Agencies, Committees and councils*, https://www.employment.gov.au/skills-agencies-committees-and-councils. [103]

Australian Government Department of Education, Skills and Employment (2020), *Skills Organisations*, https://www.employment.gov.au/SO. [37]

Australian Government Department of Education, Skills and Employment (2020), *The Survey of Employers' Recruitment Experiences: Information for participants*, https://www.employment.gov.au/SERE-participants. [104]

Australian Government Department of Education, Skills and Employment (2020), *Training packages*, https://www.employment.gov.au/training-packages. [35]

Australian Government Department of Education, Skills and Employment (2019), *Boosting future skills for the mining industry*, https://www.employment.gov.au/newsroom/boosting-future-skills-mining-industry. [39]

CEDEFOP (2018), *Lithuania: The competence voucher – a ticket to training for employees in SMEs and large enterprises*, https://www.cedefop.europa.eu/en/news-and-press/news/lithuania-competence-voucher-ticket-training-employees-smes-and-large-enterprises. [83]

CPA Australia (2020), *Managing through COVID-19: Australian State and Territory Government responses*, https://www.cpaaustralia.com.au/-/media/corporate/allfiles/document/covid-19/government-advice/state-territory-government-responses-to-covid-19-summary.pdf?la=en&rev=1f8c7891765b4fd7bb9a5e2694df8217. [5]

Deakin University (2017), *Geelong Economic Futures 2017*, https://www.deakin.edu.au/__data/assets/pdf_file/0006/925170/future-economic-opportunities.pdf. [65]

Department of Employment (2014), *Presentation given on 18 September 2014 on the Labour market of the Far South Coast of New South Wales*, https://docs.employment.gov.au/system/files/doc/other/far_south_coast_rda.pdf. [48]

Department of Health (2020), *Australian Health Sector Emergency Response Plan for Novel Coronavirus (COVID-19)*, https://www.health.gov.au/sites/default/files/documents/2020/03/australian-health-sector-emergency-response-plan-for-novel-coronavirus-covid-19-short-form-the-australian-health-sector-emergency-response-plan-for-novel-coronavirus-short-form.pdf. [2]

Department of Health (2020), *Coronavirus (COVID-19) at a glance – 14 October 2020*, https://www.health.gov.au/resources/publications/coronavirus-covid-19-at-a-glance-14-october-2020. [92]

Department of Health (2020), *Coronavirus (COVID-19) current situation and case numbers*, https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/coronavirus-covid-19-current-situation-and-case-numbers. [1]

Department of Industry, Science, Energy and Resources (2018), *Government Response to the Small Business Digital Taskforce*, https://www.industry.gov.au/data-and-publications/government-response-to-the-small-business-digital-taskforce. [90]

Department of Industry, Science, Energy and Resources (2018), *Small Business Digital Taskforce: Report to Government*, https://www.industry.gov.au/data-and-publications/small-business-digital-taskforce-report-to-government. [89]

Department of Infrastructure and Regional Development (2017), *Australian Government Response to the Independent Review of the Regional Development Australia Program*, https://www.regional.gov.au/regional/publications/files/Australian_Government_response_to_the_Independent_Review_of_the_RDA_program.pdf. [97]

Department of Infrastructure, Transport, Regional Development and Communications (2020), *COVID-19 Relief and Recovery Fund*, https://www.regional.gov.au/regional/programs/covid-19-relief-and-recovery-fund.aspx#:~:text=The%20Australian%20Government%20has%20established,affected%20by%20the%20Coronavirus%20crisis. [63]

Department of Inftrastructure, Transport, Regional Development and Communications (2021), *Geelong City Deal*, https://www.infrastructure.gov.au/cities/city-deals/geelong (accessed on 17 June 2021). [66]

Djankov, S. and E. Zhang (2021), *As COVID rages, bankruptcy cases fall*, https://voxeu.org/article/covid-rages-bankruptcy-cases-fall. [77]

Employment Facilitator - Far South Coast (2020), *Regional Employment Trials - Far South Coast Projects Update*, https://fscfacilitator.com.au/. [49]

European Commission (2020), *Evaluation of the ESF and YEI Support to Youth Employment*, https://ec.europa.eu/social/BlobServlet?docId=23027&langId=en. [52]

European Commission (2020), *The evaluation of the Youth Employment Initiative in Portugal using Counterfactual Impact Evaluation methods*, https://publications.jrc.ec.europa.eu/repository/bitstream/JRC120942/jrc120942_yei_pt_evaluation_final.pdf. [51]

European Commission (2020), *Youth Employment Initiative (YEI)*, https://ec.europa.eu/social/main.jsp?catId=1176#:~:text=The%20Youth%20Employment%20Initiative%20(YEI,higher%20than%2025%25%20in%202012. [50]

European Commission (2018), *Basque Industry 4.0 - Advanced Manufacturing Strategy*, https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/basque-industry-40-advanced-manufacturing-strategy. [68]

European Parliament (2015), *Briefing: Industry 4.0 - Digitalisation for productivity and growth*, https://www.europarl.europa.eu/RegData/etudes/BRIE/2015/568337/EPRS_BRI(2015)568337_EN.pdf. [69]

EY (2020), *Global Capital Confidence Barometer: How do you find clarity in the midst of a crisis?*, http://ey.com/CCB (accessed on 15 June 2020). [14]

Financial Times (2020), *Pandemic boosts automation and robotics*, https://www.ft.com/content/358f6454-e9fd-47f3-a4b7-5f844668817f. [15]

Government of Canada (2019), *Canada Training Credit*, https://www.canada.ca/en/revenue-agency/programs/about-canada-revenue-agency-cra/federal-government-budgets/budget-2019-investing-middle-class/canada-training-credit.html. [33]

Government of Canada (2013), *Canada Job Grant*, https://www.canada.ca/en/news/archive/2013/04/canada-job-grant.html. [82]

Government of Ontario (2020), *Promoting Excellence: Ontario Implements Performance Based Funding for Postsecondary Institutions*, https://news.ontario.ca/en/release/59368/promoting-excellence-ontario-implements-performance-based-funding-for-postsecondary-institutions. [38]

Lewis, M. and Q. Liu (2020), *The COVID-19 Outbreak and Access to Small Business Finance*, Reserve Bank of Australia, https://www.rba.gov.au/publications/bulletin/2020/sep/pdf/the-covid-19-outbreak-and-access-to-small-business-finance.pdf. [74]

ManpowerGroup (2018), *2018 Talent Shortage Survey: Solving the Talent Shortage: Build, Buy, Borrow and Bridge: Australia*, https://downloads.manpowergroup.com.au/hubfs/MPG_TalentShortageSurvey_Files/assets/MG_TalentShortage2018_AU_2.pdf?hsCtaTracking=11777e93-0fb1-478c-bbdf-a51e36af6f80%7C55a7b462-44be-4b6e-8c3f-1076b8f4e78f (accessed on 10 September 2020). [87]

Muro, M., R. Maxim and J. Whiton (2020), *The robots are ready as the COVID-19 recession spreads*, The Brookings Institution, https://www.brookings.edu/blog/the-avenue/2020/03/24/the-robots-are-ready-as-the-covid-19-recession-spreads/ (accessed on 22 April 2020). [13]

National Skills Commission (2020), *Survey of Australian businesses: the labour market impacts of the Coronavirus (COVID-19)*, https://www.nationalskillscommission.gov.au/coronavirus-survey. [100]

Nesta (2020), *Will the Lifetime Skills Guarantee help people find jobs in the aftermath of COVID-19?*, https://www.nesta.org.uk/blog/will-lifetime-skills-guarantee-help-people-find-jobs-aftermath-covid-19/. [23]

New South Wales Government (2020), *COVID-19 Recovery Plan*, https://www.nsw.gov.au/covid-19-recovery-plan. [6]

New South Wales Government (2018), *Connecting people and places*, https://www.nsw.gov.au/projects/nsw-infrastructure-strategy-2018-2038/connecting-people-and-places. [58]

New South Wales Government (2017), *Infrastructure Skills Legacy Program*, https://www.business.nsw.gov.au/__data/assets/pdf_file/0005/249206/Infrastructure-Skills-Legacy-Program.pdf. [61]

NSW Government (2020), *Regional Job Creation Fund: Program Guidelines*, https://www.investregional.nsw.gov.au/assets/Uploads/DRNSW9402-Regional-Job-Creation-Fund-finalWEB-accessible.pdf. [54]

OECD (2021), *OECD Regional Outlook 2021: Addressing COVID-19 and Moving to Net Zero Greenhouse Gas Emissions*, OECD Publishing, Paris, https://dx.doi.org/10.1787/17017efe-en. [9]

OECD (2021), *The Digital Transformation of SMEs*, OECD Studies on SMEs and Entrepreneurship, OECD Publishing, Paris, https://dx.doi.org/10.1787/bdb9256a-en. [72]

OECD (2020), "Better using skills in the workplace in the Leeds City Region, United Kingdom", *OECD Local Economic and Employment Development (LEED) Papers*, No. 2020/1, OECD Publishing, Paris, https://dx.doi.org/10.1787/a0e899a0-en. [22]

OECD (2020), *Coronavirus (COVID-19): SME Policy Responses*, https://read.oecd-ilibrary.org/view/?ref=119_119680-di6h3qgi4x&title=Covid-19_SME_Policy_Responses. [73]

OECD (2020), *Enhancing Training Opportunities in SMEs in Korea*, Getting Skills Right, OECD Publishing, Paris, https://dx.doi.org/10.1787/7aa1c1db-en. [85]

OECD (2020), *Financing SMEs and Entrepreneurs 2020: An OECD Scoreboard*, OECD Publishing, Paris, https://dx.doi.org/10.1787/061fe03d-en. [71]

OECD (2020), *Job Creation and Local Economic Development 2020: Rebuilding Better*, OECD Publishing, Paris, https://dx.doi.org/10.1787/b02b2f39-en. [7]

OECD (2020), *Preparing for the Future of Work in Canada*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, https://dx.doi.org/10.1787/05c1b185-en. [21]

OECD (2020), *Preparing the Basque Country, Spain for the Future of Work*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, https://dx.doi.org/10.1787/86616269-en. [67]

OECD (2020), *Rebuilding tourism for the future: COVID-19 policy responses and recovery*, OECD Publishing, Paris, https://www.oecd.org/coronavirus/policy-responses/rebuilding-tourism-for-the-future-covid-19-policy-responses-and-recovery-bced9859. [105]

OECD (2019), *Engaging Employers and Developing Skills at the Local Level in Australia*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264304888-en. [43]

OECD (2019), *Financial Incentives to Promote Adult Learning in Australia*, Getting Skills Right, OECD Publishing, Paris, https://dx.doi.org/10.1787/c79badcc-en. [31]

OECD (2019), *Getting Skills Right: Future-Ready Adult Learning Systems*, Getting Skills Right, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264311756-en. [11]

OECD (2019), *Indigenous Employment and Skills Strategies in Australia*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, https://dx.doi.org/10.1787/dd1029ea-en. [25]

OECD (2019), *Individual Learning Accounts : Panacea or Pandora's Box?*, OECD Publishing, Paris, https://dx.doi.org/10.1787/203b21a8-en. [30]

OECD (2019), *OECD Employment Outlook 2019: The Future of Work*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9ee00155-en. [10]

OECD (2019), *OECD Regional Outlook 2019: Leveraging Megatrends for Cities and Rural Areas*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264312838-en. [41]

OECD (2019), *OECD SME and Entrepreneurship Outlook 2019*, OECD Publishing, Paris, https://dx.doi.org/10.1787/34907e9c-en. [81]

OECD (2019), *SME and Entrepreneurship Policy in Ireland*, OECD Studies on SMEs and Entrepreneurship, OECD Publishing, Paris, https://dx.doi.org/10.1787/e726f46d-en. [84]

OECD (2018), *Getting Skills Right: Australia*, Getting Skills Right, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264303539-en. [12]

OECD (2018), *Job Creation and Local Economic Development 2018: Preparing for the Future of Work*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264305342-en. [8]

OECD (2014), *Employment and Skills Strategies in the United States*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264209398-en. [20]

OECD (2013), *Skills Development and Training in SMEs*, OECD Skills Studies, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264169425-en. [80]

OECD/ILO (2017), *Better Use of Skills in the Workplace: Why It Matters for Productivity and Local Jobs*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264281394-en. [79]

Prime Minister of Australia (2020), *Economic Stimulus Package*, https://www.pm.gov.au/media/economic-stimulus-package. [78]

Queensland Government (2020), *Jobs and Regional Growth Fund success stories*, https://www.statedevelopment.qld.gov.au/industry/industry-support/jobs-and-regional-growth-fund/success-stories.html. [57]

Queensland Government (2019), *Jobs and Regional Growth Fund*, https://www.statedevelopment.qld.gov.au/resources/brochure/jobs-and-regional-growth-brochure.pdf. [56]

Raderschall, L., T. Krawchenko and L. Leblanc (2020), "Leading practices for resource benefit sharing and development for and with Indigenous communities", *OECD Regional Development Papers*, No. 1, OECD Publishing, Paris, https://dx.doi.org/10.1787/177906e7-en. [26]

RDA Hunter (2020), *STEMship*, https://www.rdahunterstem.org.au/stemship/. [42]

Regional Development Australia (2020), *About*, https://www.rda.gov.au/about. [44]

Regional Development Australia Far South Coast (2018), *Regional overview*, https://www.rdafsc.com.au/wp-content/uploads/2018/10/regional.pdf. [47]

Regional Development Victoria (2020), *Regional Jobs Fund*, https://www.rdv.vic.gov.au/grants-and-programs/regional-jobs-fund. [55]

Reuters (2020), *Germany agrees $2.3 billion aid for auto industry to navigate technology shift*, https://uk.reuters.com/article/uk-germany-autos/germany-agrees-2-3-billion-aid-for-auto-industry-to-navigate-technology-shift-idUKKBN27I1C1?il=0. [95]

Reynolds, C. (2020), *Ottawa to spend $1.5-billion to help Canadians in hard-hit sectors train for new jobs*, https://www.theglobeandmail.com/politics/article-ottawa-to-give-15-billion-to-help-canadians-in-hard-hit-sectors/. [60]

Scottish Government (2020), *Investing in skills to support recovery*, https://www.gov.scot/news/investing-in-skills-to-support-recovery/. [24]

Service Public (2020), *Compte personnel de formation (CPF) - Secteur privé*, https://www.service-public.fr/particuliers/vosdroits/F10705#:~:text=Le%20compte%20personnel%20de%20formation,acquises%20au%20titre%20du%20Dif. [32]

Skillnet Ireland (2020), *About Us - Workplace*, https://www.skillnetireland.ie/about/. [86]

Smith, W. (2016), *Independent Review of the Regional Development Australia Programme*, https://www.regional.gov.au/regional/publications/files/Final_Report-RDA_Independent_Review_12_December_2016.pdf. [96]

The Treasury (2020), *Coronavirus SME Guarantee Scheme - supporting the flow of credit*, https://treasury.gov.au/coronavirus/sme-guarantee-scheme. [76]

The Treasury (2020), *JobKeeper extension*, https://treasury.gov.au/coronavirus/jobkeeper/extension. [93]

Thenint, H. and N. Havet (2019), *Counterfactual analysis of the added-value of Youth Employment Initiative (YEI) in France*, https://www.researchgate.net/publication/332523364_Global_Impact_analysis_of_the_Youth_Employment_Initiative_YEI_in_France. [53]

University of Sydney (2020), *Australians want to work from home more post-COVID*, https://www.sydney.edu.au/news-opinion/news/2020/09/28/australians-want-to-work-from-home-more-post-covid.html. [18]

van Deursen, A. (2020), "Digital Inequality During a Pandemic: Quantitative Study of Differences in COVID-19–Related Internet Uses and Outcomes Among the General Population", *Journal of Medical Internet Research*, Vol. 22/8, p. e20073, http://dx.doi.org/10.2196/20073. [28]

Victoria State Government (2016), *Skills First: Real training for real jobs*, https://www.education.vic.gov.au/skillsfirst/Documents/Brochures/SkillsFirstBrochure.pdf. [62]

World Economic Forum (2020), *Robots have demonstrated their crucial role in pandemics - and how they can help for years to come*, https://www.weforum.org/agenda/2020/05/robots-coronavirus-crisis/. [16]

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COVID-19 is likely to leave long-lasting effects on local labour markets. It is accelerating a pre-existing trend towards automation, as firms look even more to new technologies to pandemic proof their operations. While automation offers the opportunity to boost productivity, it can also lead to job polarisation as vulnerable workers who lose their jobs may not have the skills needed in a changing labour market. This OECD report examines the potential impacts of automation on people and places across Australia. It also sheds light on policies and programmes that can help regions and cities to prepare for the future of work.

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