



# THE NEW WORK ORDER

Ensuring young Australians have skills and experience for the jobs of the future, not the past.

fya



At the Foundation for Young Australians (FYA), we believe young people are ambitious, creative and capable of rethinking the world and solving tomorrow's problems today.

FYA is a national for-purpose organisation that is all about backing the next generation of young people who are going to rethink the world and create a better future. At FYA we connect and inspire young changemakers - the innovators, the makers, the dreamers, the thinkers, the doers and the creators.

Find out more at [fya.org.au](http://fya.org.au)

**The content of the report was prepared for the Foundation for Young Australians by AlphaBeta.**

AlphaBeta is a strategy and economic advisory business serving clients across Australia and Asia from offices in Singapore and Sydney.



**Copyright and disclaimer**

The materials presented in this report are for information purposes only. The information is provided solely on the basis that readers will be responsible for making their own assessments of the matters discussed. Readers are advised to verify all relevant representations, statements and information and to obtain independent advice before acting on any information contained in or in connection with this report. While every effort has been made to ensure that the information is accurate, the Foundation for Young Australians will not accept any liability for any loss or damages that may be incurred by any person acting in reliance upon the information.

Copyright © 2015 The Foundation for Young Australians

*The New Work Order* is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 3.0 Australian license (CC BY-NC-ND 3.0 AU)  
<http://creativecommons.org/licenses/by-nc-nd/3.0/au/>



# Contents

---

<b>FOREWORD</b>	<b>2</b>
<b>1. OVERVIEW</b>	<b>5</b>
<b>2. THREE FORCES SHAPING THE FUTURE OF WORK</b>	<b>11</b>
2.1 Automation	11
2.2 Globalisation	13
2.3 Collaboration	15
<b>3. OPPORTUNITIES IN THE NEW WORLD OF WORK</b>	<b>17</b>
3.1 Lower barriers	18
3.2 More flexibility	19
3.3 Wider markets and more specialization	20
<b>4. RISKS IN THE NEW WORLD OF WORK</b>	<b>23</b>
4.1 Unemployment	23
4.2 Inequality	26
4.3 Insecurity	27
<b>5. HOW TO MAKE WORK “WORK” FOR YOUNG PEOPLE</b>	<b>28</b>
5.1 Policies to enable	30
5.2 Policies to protect	38
<b>END NOTES</b>	<b>43</b>
<b>REFERENCE LIST</b>	<b>46</b>

# Foreword

---

**The future of work is changing. It's a reality governments, industry and communities are all grappling with. The Reserve Bank of Australia has raised concerns regarding fewer working taxpayers to older people as the baby boomers retire and young people do not replace them. We will need an innovative and entrepreneurial generation of young people to maintain our standard of living.**

The Foundation for Young Australians previous report in this series, *Renewing Australia's Promise*, clearly identified we are not investing in our young people to meet this challenge with 30% currently unemployed or underemployed and a generation more in debt and unable to access home ownership than their parents. Graduates are finding it harder to find employment and employers are reporting mismatches in the skills young people are learning and those industry requires.

*The New Work Order*, shows that more issues are ahead for young people as the most significant disruption in the world of work since the industrial revolution begins to have an impact in the next decade.

Economic changes are transforming work through automation, globalisation and more flexible work. This could bring opportunity. But it could also further disadvantage young people in labour markets. For example, the report shows currently around 70% of young Australians are getting their first job in roles that will either look very different or be completely lost in the next 10 to 15 years due to automation. Nearly 60% of Australian students (70% in VET) are currently studying or training for occupations where at least two thirds of jobs will be automated. Over 50% of jobs will require significant digital skills and yet our young people are not learning them in schools.

At FYA we see a significant opportunity to sure up our nation's future by investing in the next generation and backing them to create the kind of world they want to live in. Core to this will be a generations of enterprising young people who are job builders and creators, not only job seekers.

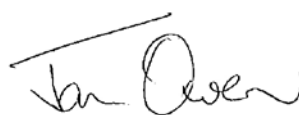
That's why FYA is calling for a national enterprise skills strategy to ensure young people are prepared for the economy of the future and equipped with the tools to drive economic and social progress. We want all young Australians to learn the skills to be digitally-literate, financially-savvy, innovative and adaptable and help them navigate complex careers of the future.

Enterprising skills are transferrable across different jobs and are a more powerful predictor of long-term job success and performance than technical knowledge. They include: communication; project management; financial literacy; digital literacy; and the ability to critically assess and analyse information, be creative and innovate. An enterprising skills education would:

- > begin early in primary school and build consistently, year on year, throughout high school
- > be provided in ways that young people want to learn: through experience, immersion and with peers
- > provide accurate information and exposure about where future jobs will exist and the skills to craft and navigate multiple careers
- > engage students, schools, industry and parents in co-designing opportunities in and outside the classroom.

Our policy choices today will determine whether Australia's young people are ready to take on the challenges of the future for decades to come. These are not just challenges for individual young people. They are challenges for our nation.

We must act now to ensure young Australians can thrive in this new work order.



**Jan Owen AM**

CEO

Foundation for Young Australians





**Preparing young people for the new future of work is an issue of national importance.**

## YOUNG PEOPLE NEED SKILLS AND EXPERIENCE FOR JOBS OF THE FUTURE, NOT THE PAST

---

70%

of young people currently enter the workforce  
in jobs that will be radically affected by

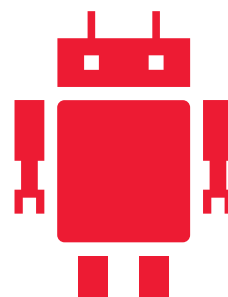
**AUTOMATION**

**OCCUPATIONS:**

**ENTRY LEVEL**

roles for young people are

**DISAPPEARING**



**TRAINING:**

60%

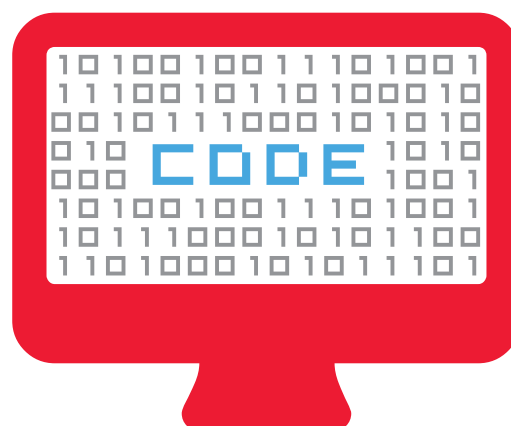
of students are being trained  
in jobs that will be radically

**CHANGED BY AUTOMATION**

**DIGITAL LITERACY:**

**MORE THAN  
HALF**

of Australian workers will need to be  
able to use, configure or build digital  
systems in the next 2-3 years



# 1. Overview

---

**Work has long been important for the livelihood, dignity, and happiness of humankind. We intuitively and statistically know that work helps us meet our most basic and complex needs, providing a path towards financial security, mental and physical health, dignity and meaning. For at least the past century, the prospect of a good job that pays a fair wage has been part of Australia's promise to our young people.<sup>1</sup> By many measures, Australia has continued to deliver on its promise. We have enjoyed relatively strong economic growth, high wages and low levels of unemployment.**

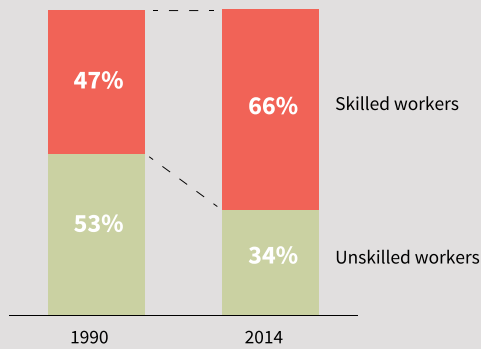
But beneath the seemingly benign surface of Australia's labour market, there is a quiet revolution occurring in the way we work. The old 'blue collar' part of workforce is barely recognisable today. As the factories in our urban manufacturing suburbs have been closed down or automated, the manual jobs they once provided have been decimated. Over the past 25 years, we have lost around 100,000 machinery operator jobs, nearly 400,000 labourers, and nearly 250,000 jobs from the technicians and trades.<sup>2</sup> Offsetting these losses, there has been an explosion of more than 400,000 new jobs in community and personal services. The work revolution is no less visible in what we used to call 'white collar' jobs. Computers have swept through corporate towers and small business offices, displacing nearly 500,000 secretaries and clerks. At the same time, the increasing complexity of business processes and financial markets has created 700,000 new jobs across the professional and business services.

While our unemployment rate may be low, our factory floor workers have not seamlessly switched their hard hats for a healthcare job. Instead, unskilled workers, especially men, have stepped out of the labour force on mass. Over the past 25 years, nearly one in ten unskilled men lost their jobs and did not return to the labour force. Today, more than one in four unskilled men don't participate.<sup>3</sup> Big economic shifts are not costless for everyone.



### The last 25 years saw the rise of skilled workers...

% of employed labour force

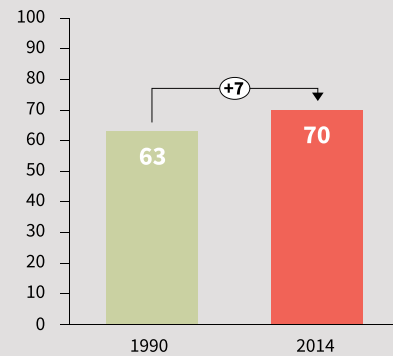


Source: ABS



### ...And women participating at much higher rates

Participation rate (15-64)



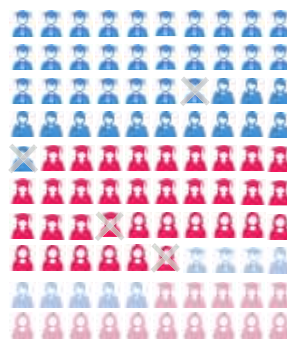
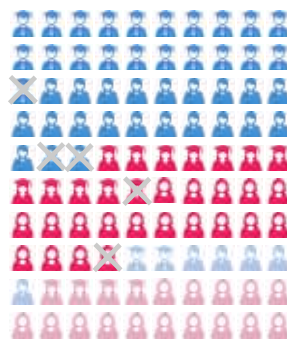
Source: ABS

### Australia's working age population (15-64yrs)

By gender, skill level and labour force status

1990

2014

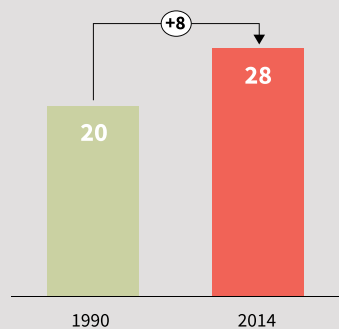


Source: ABS, AlphaBeta analysis



### ...But they are a story of unskilled men exiting the labour force

% of unskilled men aged 15-64 not participating

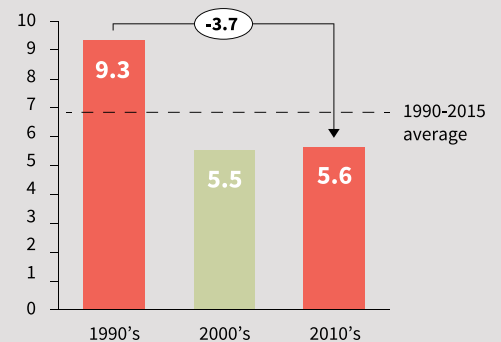


Source: ABS and AlphaBeta analysis



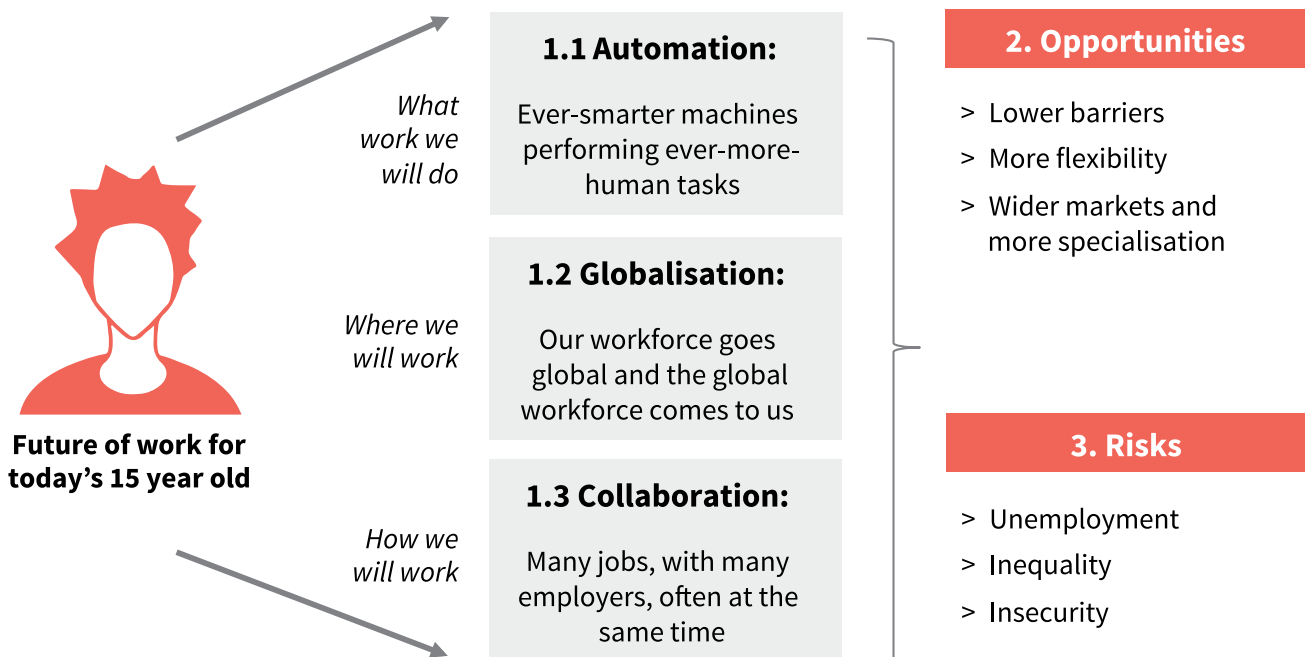
### The last 25 years are not a story of higher unemployment...

% of labour force unemployed



Source: ABS





Young people already struggle with challenging pathways into work. Around Australia, nearly one in three young people are currently unemployed or underemployed. On top of this staggering underutilisation of our young talent, around one in seven young people who are not studying have stepped out entirely from the labour force and don't appear in the unemployment figures. For those who are working (and not studying), the work is often part time. More than one in three 15-19 year olds (39%) who are not studying and one in four 20-24 year olds (26%) are in part time work.<sup>4</sup>

Looking forward, the revolution in work for young Australians will be driven by three economic forces.

**Automation: Ever-smarter machines are performing ever-more human tasks – taking, replacing or eliminating the need for whole categories of employment.**

The technologies that automated millions of routine transaction jobs (such as clerical work) and production jobs (such as assembly-line work) are now rapidly encroaching on more complex routine and non-routine tasks. In Australia, some 40% of our current jobs are considered at high risk of automation over the next 10-15 years.<sup>5</sup> Critically, our young people are not being trained in the jobs that will survive automation. More than half of young Australian students are currently getting educated for dying jobs: nearly 60% of students are being trained in occupations where the vast majority of jobs will be radically affected by automation in the next 10-15 years. If we focus on VET students, this number rises to 71% of students.<sup>6</sup>

**Globalisation: Our workforce is going global and the global workforce coming to us.**

The globalisation of labour is not a new phenomenon and in the future, we should expect to see the continued rise of trade and the physical mobility of people. Australia has already lost hundreds of thousands of manufacturing jobs to competing locations around the world. Now, new technology platforms are making it possible for foreign workers to do jobs in Australia from remote locations including legal, IT, design, architecture and business services. Research suggests that up to 11% of service sectors jobs may be at risk from being lost to workers undertaking jobs in Australia from foreign countries.<sup>7</sup>

**Collaboration: Technology is increasing the potential for cooperation and collaboration across multiple platforms.**

While the archetypal worker is a full-time employee on an indefinite contract, the future will see the continued rise of the flexible worker engaged in work with a range of different employers, potentially at the same time. Since the 1990s, more than half of the jobs growth across the OECD (54%) has been in roles that are temporary, part-time or self-employed.<sup>8</sup> Such figures, which typically account for only the primary source of income, might mask an even wider trend towards multiple sources of secondary income. Survey data suggests that some 30% of Australia's workforce are engaged in flexible work, including moonlighting, multiple part-time and casual roles, and independent contracting.<sup>9</sup>

These forces present massive changes in the way we work and will throw open new opportunities for young people.

- > **Lower barriers:** The barriers to entrepreneurship are falling. Technology and globalisation are making it easier and cheaper at multiple stages in the lifecycle of a start-up.
- > **More flexibility:** New technologies and ways of working are providing unprecedented flexibility in how and where people work, which is one of the key drivers of worker happiness. Looking ahead, around 70% of Australia's <34 year olds are open to using a digital talent platform (e.g. Airtasker, Freelancer) to source income in the next year. Research has indicated that adoption of digital talent platforms in Australia is estimated to add 1.9% to GDP and 271,000 jobs by 2025 as a result of higher participation and hours worked, lower unemployment and higher productivity.<sup>10</sup>
- > **Wider markets and specialisation:** Technology has accelerated the division of labour and enabled companies to divide up work into ever-smaller tasks that can be sourced from a global labour pool. Young people in Australia are getting more educated and graduate at higher rates than OECD averages.

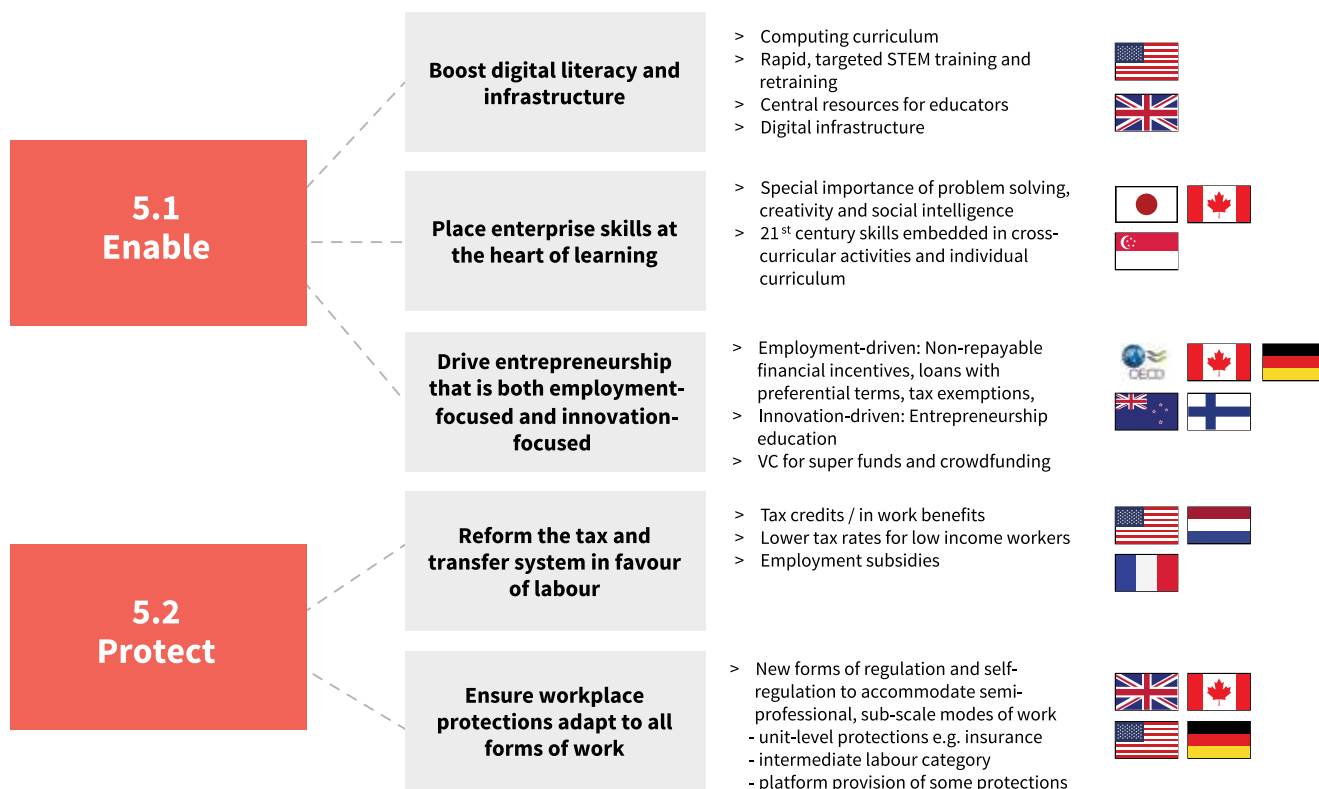
The effects of the forces in the future of work are not ambiguously positive and will present key risks for the ongoing promise of safe jobs and decent pay. Given their relative disadvantage in the labour market, young people are likely to bear a lion share of these risks.

- > **Unemployment:** One risk is growing unemployment. Already nearly one in three young people in Australia are either unemployed or underemployed. And over the past 25 years, nearly one in ten unskilled male workers lost their jobs and never found another. Today, more than one in four working-aged unskilled men are neither in work nor looking for a job.<sup>11</sup> The occupations that help young people get their foothold in the workforce are dying. Around 70% of young people in Australia currently enter the labour market in jobs that will be lost or radically affected by automation over the next 10-15 years.<sup>12</sup>
- > **Inequality:** Another risk is rising inequality. As skilled labour becomes more valuable, and unskilled labour becomes a global commodity, incomes are likely to continue to diverge. Pay for the skilled will rise, while unskilled workers will be forced to compete with low cost automation at home and foreign workers abroad. Already these forces have contributed to growing inequality in Australia. Over the past 15 years, incomes of the top 10% have grown 13% higher than the bottom 90%. Incomes of the top 1% have grown 42% higher.<sup>13</sup>
- > **Insecurity:** Finally, the future of work contains a risk of increased employment insecurity. More than half of new jobs in advanced economies since the 1990s have been temporary, part-time or self-employed.<sup>14</sup> The collaborative economy presents enormous opportunities, but important questions remain unanswered: how will the collaborative economy maintain social protections? How can perpetually flexible workers access entitlements like minimum wages, insurance, sick leave and parental leave?

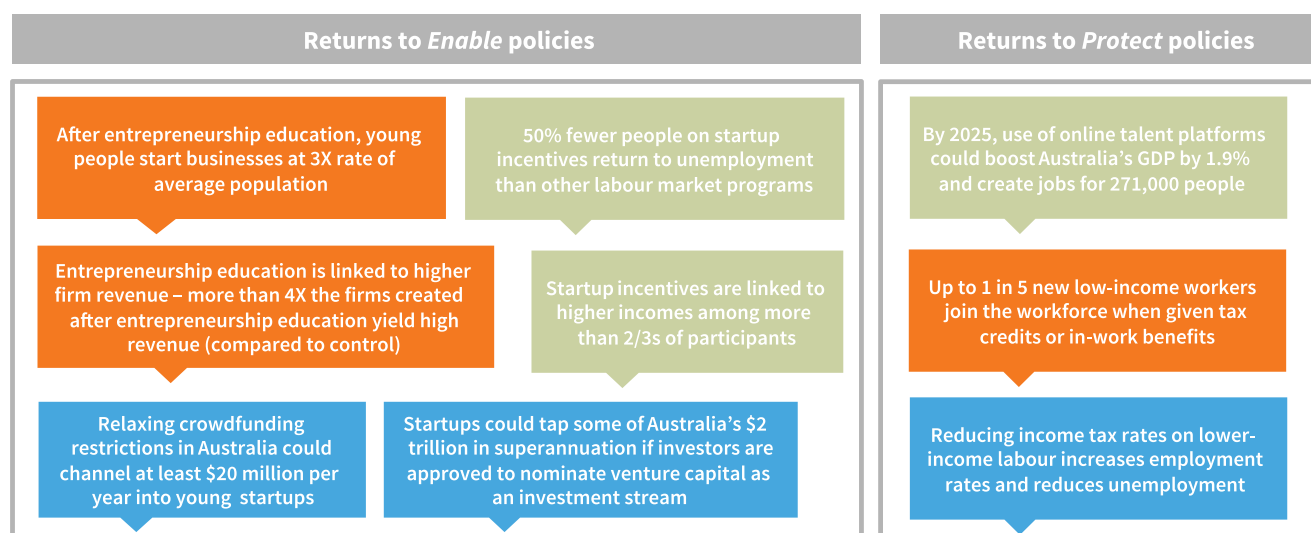
The future of work, especially its inherent risks, need not be cast in stone for young Australians. The critical question for Australia is: How do we ensure that the future of work maintains reward and opportunity for all young Australians?

**The answer** depends, in part, on our policy responses. In this document, we look at some of the ways policymakers around the world are dealing with similar challenges and opportunities. We have observed policies that both *enable* participation in this future of work and *protect* workers from the downsides. Many of these policies are worthy of consideration in Australia. We can take active steps to both enable young people in this future and offer protections against the worst risks.

## Policy options and international examples



Globally, these policy options have generated different social and economic returns.<sup>15</sup> Promisingly, many of these policies have enjoyed significant positive impacts on growth, employment, income and equity.



## THREE GLOBAL FORCES, AUTOMATION, GLOBALISATION AND COLLABORATION, ARE REVOLUTIONISING THE WAY WE WORK

### AUTOMATION:

40%

of Australian jobs are at high risk of automation in the next 10-15 years



#### GAINED IN THE PAST 25 YEARS:



700,000  
professionals



400,000  
health & security  
workers



#### LOST IN THE PAST 25 YEARS:



500,000  
secretaries



400,000  
labourers



250,000  
tradies



100,000  
machinery workers

#### LOST IN THE PAST 25 YEARS:



33%+  
manufacturing exports  
down in past 20 years

### GLOBALISATION:

11%

of our service jobs could be provided remotely from abroad

#### GAINED IN THE PAST 25 YEARS:



SERVICES FROM  
ABROAD  
finance, IT, technical  
& professional

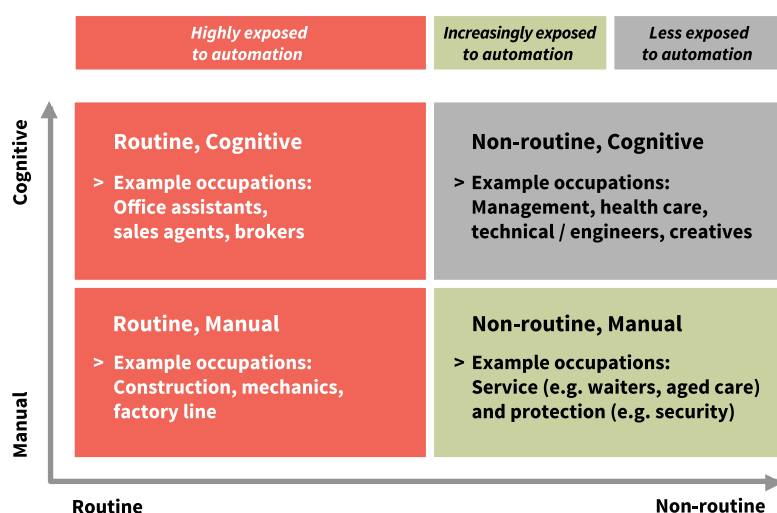


### COLLABORATION:

30%

of Australians workers are already participating in flexible working arrangements, involving multiple jobs / employers

Fig 1. Smart machines will impact different types of jobs in different ways



Source: Adapted from Autor, Levy and Marnan (2003)

## 2. Three forces shaping the future of work

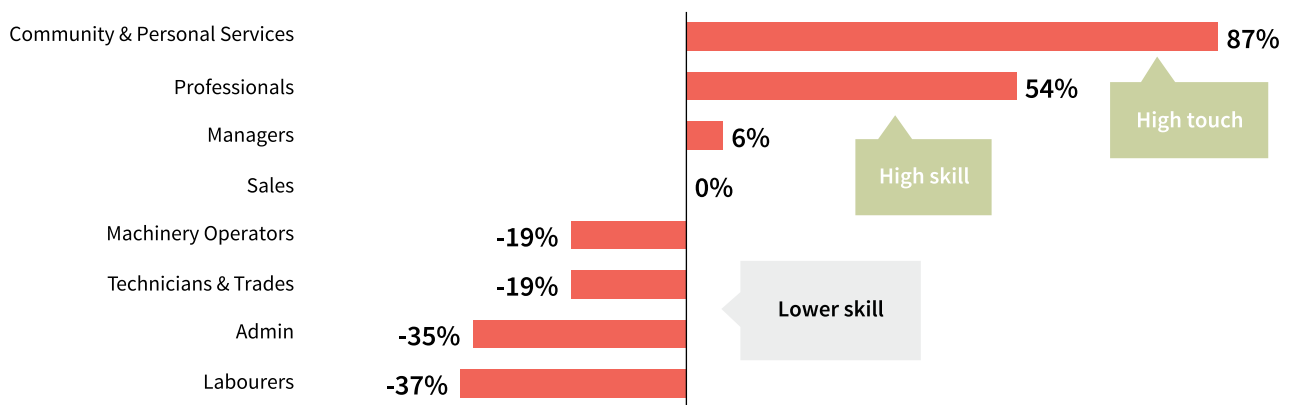
The future of work for young Australians will be characterized by flexibility and continuous change in how, what and where young people will work. The three key forces that will shape the future of work are: **automation: ever-smarter machines performing ever-more human tasks; globalisation: our workforce going global and the global workforce coming to us; and collaboration: many jobs, with many employers, often at the same time.** Other non-economic forces such as climate change and sustainability are not covered in this report, although the impact of such forces on work will be significant.

### 2.1 AUTOMATION

#### Ever-smarter machines performing ever-more-human tasks

Concerns that smart machines will herald the 'end of work' have abounded for the best part of two centuries. The Luddites famously protested the introduction of labour-economizing technologies in their textile factories in the early 1800s. As the snapshot of work over the past 25 years in Australia shows, unemployment has not been driven to astronomical heights. However, the composition of the workforce has undeniably shifted towards skilled workers, and different groups have been winners and losers as a result.

**Fig 2. Occupations that are high skill or high touch have grown, while lower skill routine occupations have shed jobs, 1991 to 2015**  
 % growth in # of jobs by occupation – growth in total labour force



Source: ABS, AlphaBeta analysis

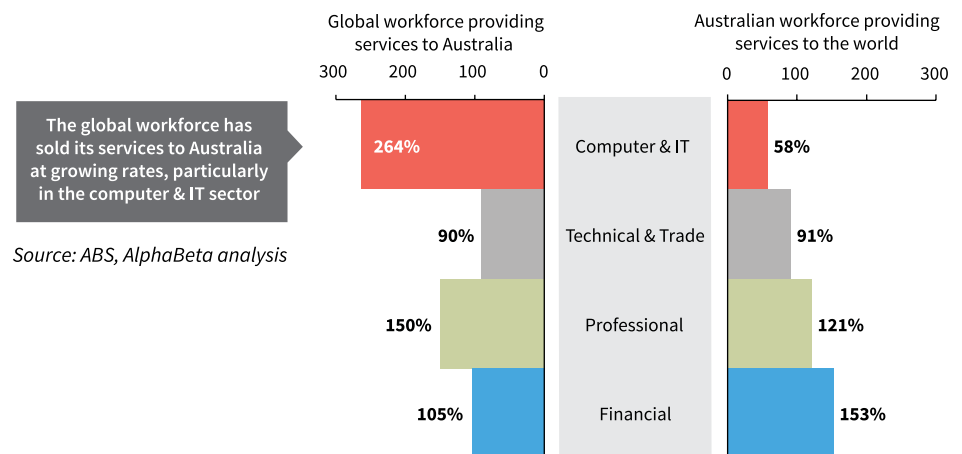
To breakdown and understand the impact of technology (especially automation) on jobs, economists have classified occupations as comprising cognitive and manual tasks, which are performed in either routine or non-routine ways (see Figure 1).<sup>16</sup> Technology has affected the relative share of routine and non-routine jobs in our workforces. Specifically, both cognitive and manual routine jobs (procedural, rule-based activities) are well suited to smart machines and, as a result, occupations like brokers and factory workers have increasingly been automated. Non-routine work, which requires interpersonal or environmental adaptability or problem solving and creativity, are less exposed to the rise of smart machines. However, as smart machines learn to recognize visual and language cues and develop situational adaptability (like driverless cars), the machines will increasingly compete for manual non-routine jobs and some cognitive jobs.

The impact of smart machines is a global phenomenon and the Australian economy is no exception. Over the past 25 years, the highest jobs growth has been enjoyed in occupations that are either high touch or high skill (see Figure 2). The number of jobs in community and personal services has grown 87%, after accounting for total growth in the labour force, and the number of jobs in professional occupations has grown 54%.<sup>17</sup> As the snapshot of Australia's workforce in the past 25 years showed, the winners of this trend have been skilled workers and women. Conversely, medium and lower skill occupations have experienced either no growth or negative jobs growth, once we account for total growth in the labour force. The losers in this trend have been the unskilled, and especially unskilled men. While their unemployment rate is only marginally higher than the national average, the proportion of unskilled men that have stepped out of the labour force (rather than moving onto unemployment rolls), has dramatically increased from 20% to 28%.



**Fig 3. Australia has substantially grown the services it has bought and sold abroad**

% growth of trade in services (1999-2014)



## 2.2 GLOBALISATION

### Our workforce goes global and the global workforce comes to us

The globalisation of labour is not a new phenomenon. For at least 50 years, many companies have viewed their potential labour pool as global. Companies flexibly manage labour from different countries in different parts of their supply, production, distribution and sales channels. Technology intensifies the globalisation of labour, by enabling employers and workers to more easily connect and transact across geographies.

In the future, we should expect continued physical mobility of labour. Indeed, the **physical mobility of labour** is so mainstream that a survey of more than 200,000 individuals worldwide found that nearly 2 in 3 respondents were already working overseas or willing to move abroad for work.<sup>18</sup>

While the physical mobility of labour is nothing new, the rise of the **virtual global worker** is a new and potentially very disruptive force. Technology, especially digital talent platforms like Upwork, enables talent to provide their services to a global employer base and still remain in their local geography to conduct the work. In particular, online talent platforms allow companies (especially SMEs) to tap into talent from geographies that are lower cost or hyper-specialized in skills. As Bill Gates has observed, “We’re going to tap into the energy and talent of five times as many people as we did before.”<sup>19</sup>

Indeed, the relocation of global manufacturing and its supply chains to geographies with cheap labour may well be repeated in other areas of work, but this time with remote service work. Economists have estimated that 11% of the world’s service jobs can be performed remotely.<sup>20</sup> As Figure 3 shows, over the past 15 years there has been strong growth in the labour services purchased from abroad by Australians in computer and IT, technical and trade, professional and financial services. In some categories, such as IT, services purchased from abroad are growing at a much faster rate than our sales of services to the world. In absolute terms, the amount sold abroad by Australians does not exceed the amount we purchased in any of the services listed in the graph.

The birth of online digital platforms will only intensify this trend. Australians will now need to compete with virtual talent from many other countries. Australian businesses are already sourcing work remotely. Australia is not among the top five source countries for work paid by Australian businesses on Upwork. Before allocating work to Australians online, Australian businesses are sourcing work (especially IT work) from India, Philippines, US, Bangladesh and Pakistan.<sup>21</sup>



*“As the world has gone flat, (Bill) Gates said, and so many people can now plug and play from anywhere, natural talent has started to trump geography.*

*Now I would rather be a genius born in China than an average guy born in Poughkeepsie.”*

*– Bill Gates, in ‘The World is Flat’*

## 2.3 COLLABORATION

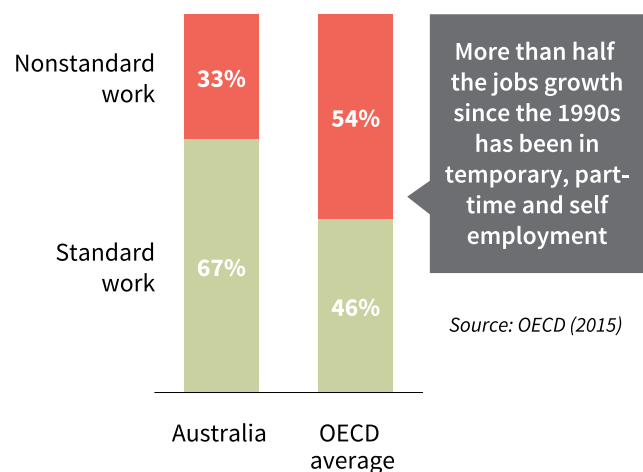
**Many jobs, with many employers, often at the same time**

When we imagine the archetypal worker, we think of a full-time employee on an indefinite contract. However, this model of work has only been dominant for around 60 years. Again, we are witnessing the rise of the flexible worker. Since the 1990s, nearly 60% of the growth in jobs across the OECD has been in jobs that are temporary, part-time or self-employed (see Figure 4).<sup>22</sup> Such figures, which typically account for only primary income, might mask an even wider trend towards multiple sources of secondary income. Indeed, recent survey data suggests that up to 30% of the Australian workforce are participating in flexible work arrangements, where they take a portfolio approach to their working life.<sup>23</sup>

This force is unlikely to herald the death of the firm. For many tasks, firms will remain the most efficient way to organize resources. However, as technology lowers the transaction costs and risks associated with finding, verifying and paying for talent, the logic of the firm won't hold true for all tasks, and we'll continue to see flexible forms of work on the rise.

**Fig 4. Most jobs created in the OECD were temporary, part-time and self employment**

*% of jobs growth in nonstandard and standard work, 1990 to 2015*



## AUTOMATION, GLOBALISATION AND COLLABORATION PROVIDE **BIG OPPORTUNITIES** FOR YOUNG AUSTRALIANS

---

### LOWER BARRIERS:

Since 2005, the cost of starting  
a business has fallen

**65%**  
**GLOBALLY**



### MORE FLEXIBILITY:

**70% OF AUSTRALIANS <34**

are willing to use digital talent platforms like Uber  
and Freelancer.com to find work which could add

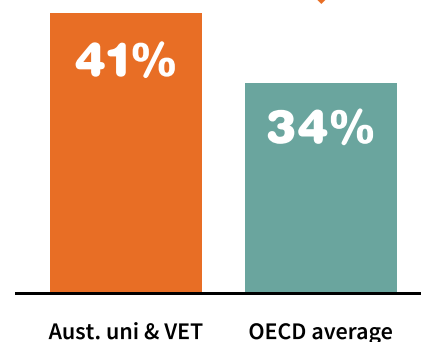
**270,000+ JOBS** *(and add 1.9%  
of GDP by 2025)*

### WIDER MARKETS, MORE SPECIALISATION:

Since 2000, Australians have  
**DOUBLED THEIR  
EARNINGS**  
from foreign employment.

More young people are graduating  
from uni and VET which means  
we're well placed to sell our  
**SERVICES ABROAD**

#### GRADUATION RATES



# 3. Opportunities in the future of work

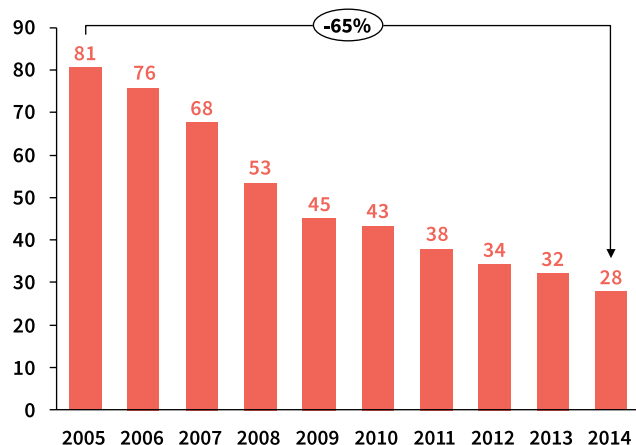
---

**Jobs are not only important to our livelihood, they are also an important part of our lives and a key contributor to our happiness. The International Social Survey Programme asks workers around the world to rank eight different job characteristics in terms of their importance to their overall happiness at work. The characteristics are: high income, flexible working hours, good opportunities for advancement, job security, interesting work, independence, helping other people, usefulness to society. The survey reports that 20% of respondents in OECD countries believe that having a high income is very important. But nearly 60% say that job security is very important, 50% say interesting work is important and 30% say autonomy is important. Similarly, measures of job satisfaction tend to emphasize the significance of job security, meaningful work, stimulating tasks and workplace culture.**

The three trends shaping the future of work – automation, globalisation and collaboration – present opportunities as well as risks to Australian workers. In particular they offer the opportunity not only for higher productivity jobs, but also more creative, independent and meaningful employment.

**Fig 5. Cost of business startup procedures, global average**

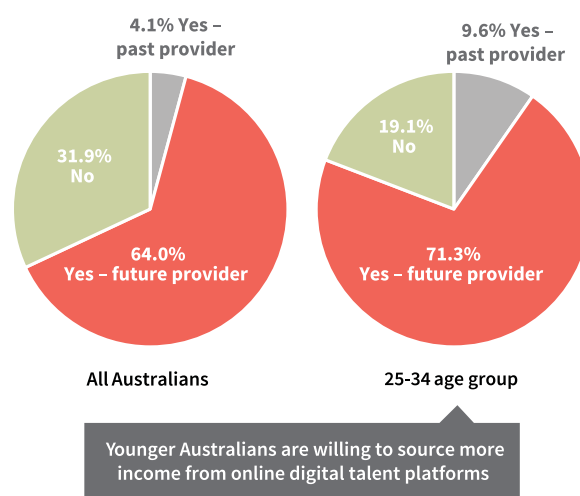
% of GNI per capita



Source: World Bank

**Fig 6. More than half of younger Australians are willing to earn income as a service provider on digital platforms**

% of survey answers to the question: "Would you consider earning some extra money in 2015 through "on-demand" services through apps/websites such as Airtasker, Freelancer... etc?"



Source: Airtasker

### 3.1 LOWER BARRIERS

The barriers that once prevented people starting their own business are falling, enabling more young people to turn their own innovative ideas into careers. The figure shows that the cost of starting a business around the world has fallen dramatically over the last 10 years as a result of more efficient regulatory regimes and start-up procedures.

New firms are benefitting from significant reduction in start-up costs, especially those related to IT, sales and marketing. The growth of electronic communications, cloud computing other low cost technologies have materially reduced the expenses associated with starting up a new firm and extended the possibility of outreach to new customers. Technology reduces the cost and time barriers to entrepreneurship at multiple points along the startup lifecycle:

1. Product development: the building blocks for digital services and products have become so evolved, cheap and ubiquitous that they can be easily combined and recombined.
2. Market testing: inexpensively and rapidly observe customer behaviour responses online to beta product versions.
3. Financing: requiring less capital intensity and sourcing funding from a wider capital pool including crowds.
4. Marketing and sales: driving marketing and sales through online channels.
5. Customer service and feedback: collecting real time customer feedback or observing customer behaviour online.

In recognition of these lower barriers, young people globally have high levels of confidence about their capacity to create their own job, to become entrepreneurs. A recent global survey of 12,000+ Millennials (aged 18 to 30) found 68% of respondents believe they have the opportunity to become an entrepreneur.<sup>24</sup>



Fig 7. Case studies of Uber drivers



**Chad** is an entrepreneur who drives on Uber to support his family in between working on a project to minimise water wastage.



**Karen** drives on Uber to help support her politics and law study. She balances Uber driving with theatre work and volunteering at United Nations Youth Australia.



After being made redundant, **Tanya** is now formalising her skills with a Bachelor of Business, and driving on Uber to support her studies.

Source: Uber

### 3.2 MORE FLEXIBILITY

Recent research has highlighted the importance of work flexibility to job satisfaction. A University of Chicago study of 4,500 workers found that job satisfaction was materially higher for workers who had some discretion over their hours and place of work. In fact discretion of the timing of one's work matters more for satisfaction than the overall hours of work or income.<sup>25</sup> Another study found that 35% of employees want more flexible schedules and 46% of employees say that flexibility is the most important aspect when looking for a new job.<sup>26</sup>

In order for employees to balance the demands of the workplace with the enjoyment of being with their friends and family, companies need to allow them to work flexible hours and remotely. This way, employees can work when they are most productive and have enough time to drop their children at school or have lunch with a family member. Technology enables individuals to work more flexibly within large organisations, where improving communications facilitates a wider range of work practices.

Technology is also reshaping workplace flexibility by growing the sharing and on-demand economy where workers have unprecedented autonomy over their hours of work. The sharing economy, or peer-to-peer capitalism, enables individuals to share their under-utilized assets to generate income.

Some of the key barriers to this type of income generation in the past are now overcome through technology. Specifically, an individual is able to easily locate an under-utilized asset, build trust in the provider through third-party reviews, and securely make payments that don't require in-person transactions.

On-demand platforms such as Uber, Freelancer and Airtasker provide Australians with tools to flexibly source income and, sometimes, to access work where they otherwise couldn't (as a caregiver or disabled person) or to lift themselves out of unemployment. As Figure 6 shows, Australians are already using on-demand platforms to top-up their incomes. Australians and especially young people also look set to source more income from digital talent platforms, with 64% and 71% respectively indicating they would consider earning additional income during the coming year by providing services through a digital talent platform like Airtasker or Freelancer.

Where formal structures have proven inadequate or restrictive, these online tools are enabling workers to top-up their incomes or sometimes ward off unemployment (see Figure 7). These forces are in their nascent stages and early data indicates they will become a feature of our work landscape.

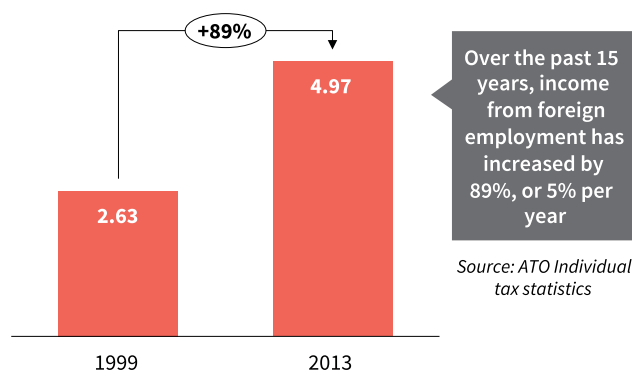
### 3.3 WIDER MARKETS AND MORE SPECIALIZATION

Adam Smith's *Wealth of Nations* published in the 18th century explained that one of the key drivers of human progress was the division of labour. By dividing work into ever smaller tasks, economies are able to consistently improve the efficiency of production. Today, the rise of the knowledge economy and advances in communications technology have accelerated the division of labour, leading us into what some have called 'the age of hyperspecialisation'. It's now possible, for the first time in history, to transmit information around the world almost costlessly. This presents an enormous opportunity for productivity improvements and greater scope to reach new markets. Technology has enabled Australian businesses to access new markets to sell their goods or labour services. Australians are already capitalising on this opportunity. As Figure 8 shows, over the past 15 years, Australians have nearly doubled the income (in real terms) that they generate from their own foreign employment.

Looking forward, Australians are well placed to continue to sell their services abroad. As Figure 9 shows, Australians graduate at both the university and vocational levels at higher rates than the OECD average. The trend of high skill graduation rates will likely continue. Analysis of qualification levels among current 20-24 year olds in Australia reveals an increasing proportion of students are qualified at higher VET levels and above (Figure 10). As a further indication of the future trend, the most recent HILDA survey shows that approximately 60% of parents of primary school students believe their children will definitely or probably go to university.<sup>27</sup> These high qualification rates and intentions bode well for the pipeline of high skilled talent moving into the labour force and competing for high skill jobs abroad.

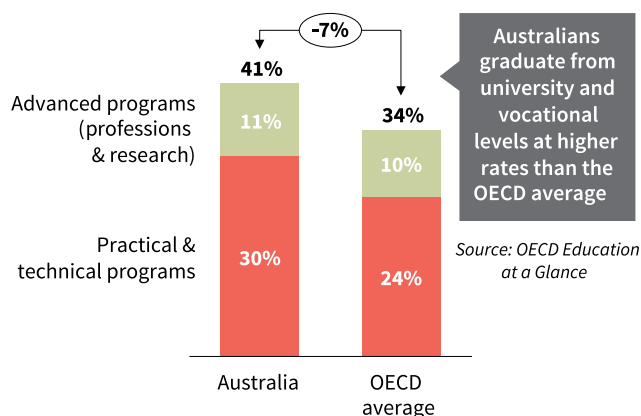
**Fig 8. Australian earnings from foreign employment have nearly doubled over past 15 years**

\$ earned from foreign employment, real 2013



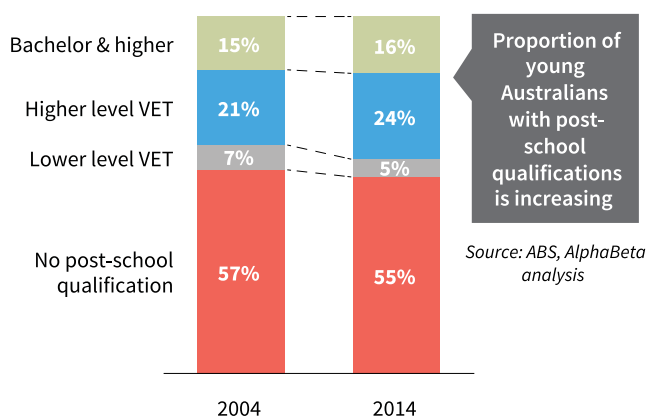
**Fig 9. Australians graduate at higher rates than OECD peers**

% of 25-64 yr olds, 2012 Australia and OECD



**Fig 10. Young Australians are getting more educated**

% of 20-24 year olds, qualification level







## AUTOMATION, GLOBALISATION AND COLLABORATION PRESENT **KEY RISKS** TO YOUNG AUSTRALIANS

---

### UNEMPLOYMENT:

**1 IN 3**   
young Australians are  
**UNEMPLOYED**  
or  
**UNDEREMPLOYED**

---

**50%**   +

of the Australian workforce are  
in jobs that will be affected by  
automation in the next 10-15 years

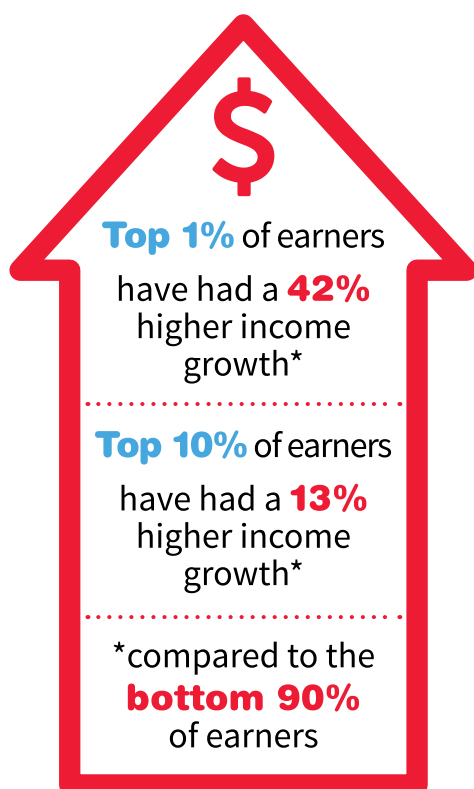
---

**70%** 

of young people will enter the  
labour market in jobs that will  
be lost or automated

### INEQUALITY:

Over the past 15 years:



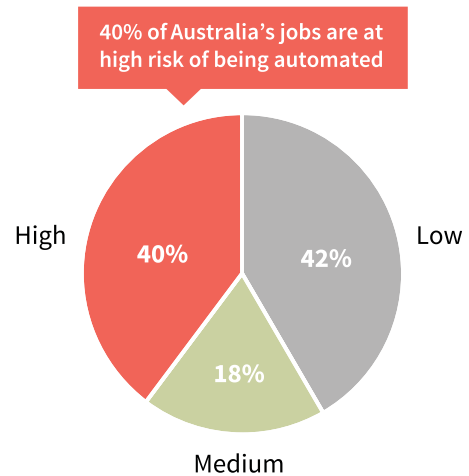
### INSECURITY:

  
**ONE THIRD**  
of jobs created in Australia over  
the past 25 years have been  
**LESS SECURE** temporary,  
part-time or self employment

Australian workers are  
**AT RISK OF LOSING THEIR  
SOCIAL PROTECTIONS**,  
such as minimum wage, insurance  
and leave entitlements

**Fig 11. Many existing Australian jobs are at risk of automation in 10-15 years**

*% of jobs, level of risk of automation*



*Source: CEDA (2015) Chapter 1.4*

## 4. Risks in the future of work

### 4.1 UNEMPLOYMENT, OR EXITING THE LABOUR FORCE

#### **Workforce-wide unemployment?**

Around the world, governments, economists, scientists and the media are currently debating the potential impact of automation on unemployment. A recent headline-grabbing statistic has been that approximately 40% of Australia's jobs are at high risk of automation over the next 10-15 years (see Figure 11). The modelers behind these figures have been at pains to explain that the figures don't account for new job creation. Indeed, whether or not new jobs will step into the breach is hotly debated: will the next wave of technological innovation replace labour or spawn new jobs that complement technology?<sup>28</sup> Those who argue technology will replace labour suggest that, for the first time, smarter machines are capable of learning, adapting and moving into non-routine tasks. Those in the other camp point to the continual reinvention of the economy: 85% of the jobs in 1900 had disappeared by 2000 but we have not experienced mass unemployment.<sup>29</sup>

Whatever the case, in the past in Australia, important transitions in our economic base have not been costless for all groups. While some of Australia's workforce has retrained and moved into new occupations, a high percentage of unskilled workers instead exited the workforce.

The distributional impact of this forecast, while less popularly discussed, is no less dramatic or important. Technology and automation does not affect all occupations equally. In the past, technology has enabled firms to replace lower-skilled workers with machines. For example, secretarial functions in offices have been partially replaced by computers and supermarkets now use automated checkout machines. At the other end of the spectrum, skilled workers have enjoyed efficiency benefits from the introduction of machines. Economists call these two forces 'skill biased technological change' which means that, over time, new technologies have caused the employment and incomes of skilled workers to increase.

The distributional impact of this forecast, while less popularly discussed, is no less dramatic or important. Technology and automation does not affect all occupations equally. In the past, technology has enabled firms to replace lower-skilled workers with machines. For example, secretarial functions in offices have been partially replaced by computers and supermarkets now use automated checkout machines. At the other end of the spectrum, skilled workers have enjoyed efficiency benefits from the introduction of machines. Economists call these two forces ‘skill biased technological change’ which means that, over time, new technologies have caused the employment and incomes of skilled workers to increase.

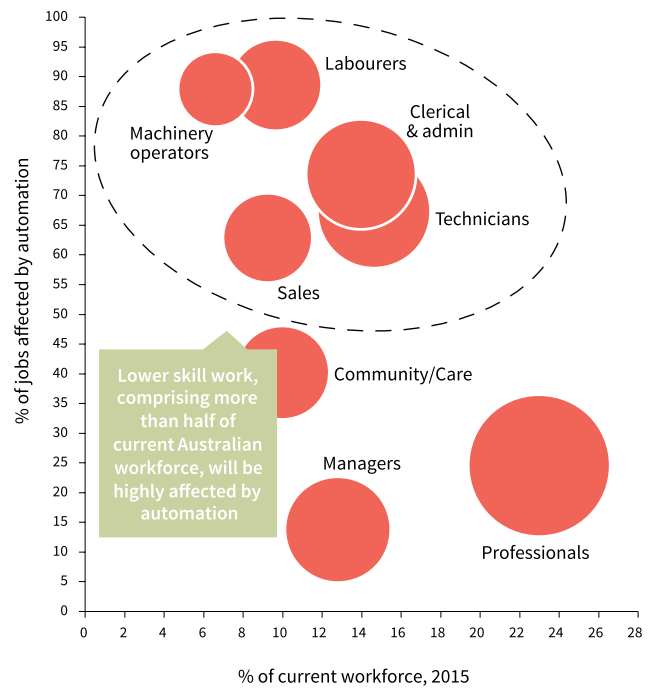
Looking to the future, Figure 12 highlights the percentage of Australia’s jobs in each occupation that will be affected by automation. Economists predict that smart machines will struggle to automate problem solving, creative and social intelligence tasks. Indeed, many cognitive tasks are often complementary to technology because they draw on information as an input, which is becoming cheaper to access. By contrast, economists predict that a higher proportion of lower-skill jobs, such as labourers, machinery operators, and administrators, will be affected by automation in the next 10-15 years. While nearly half of Australia’s current labour force is employed in high skill occupations (36%) or high touch, interpersonal occupations (10%), a sizeable proportion are employed in lower skill occupations. Initially, this may drive unemployment among these groups and eventually, as in the past, reduce participation in the labour market by these groups.

*“None of us could have known, much less pronounce the job descriptions of any of our grandchildren.”*

– John Galbraith, Harvard University

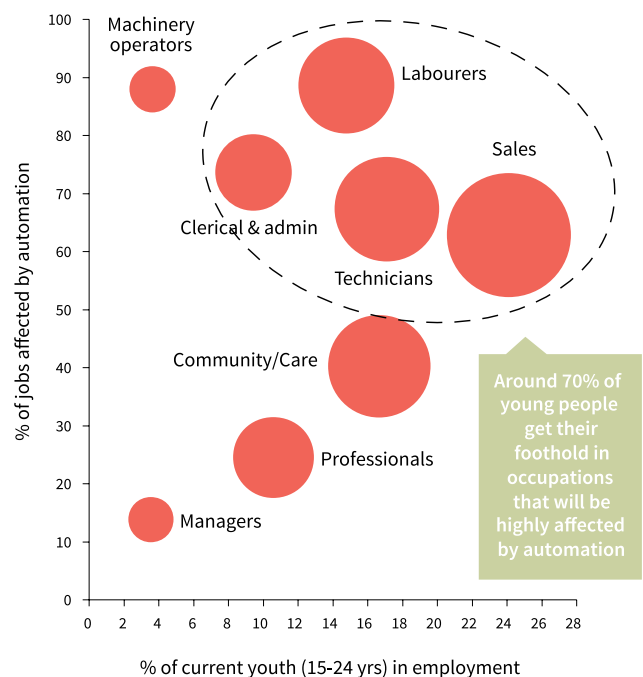
**Fig 12. Occupations affected by automation over next 10-15 years in Australia**

Bubble size = % of workforce in that occupation, 2015



Source: CEDA (2015), ABS and AlphaBeta analysis

**Fig 13. Most young people in Australia enter the labour market in jobs that will be radically affected by automation**  
Bubble size = % of employed youth (15-24 yrs) in that occupation

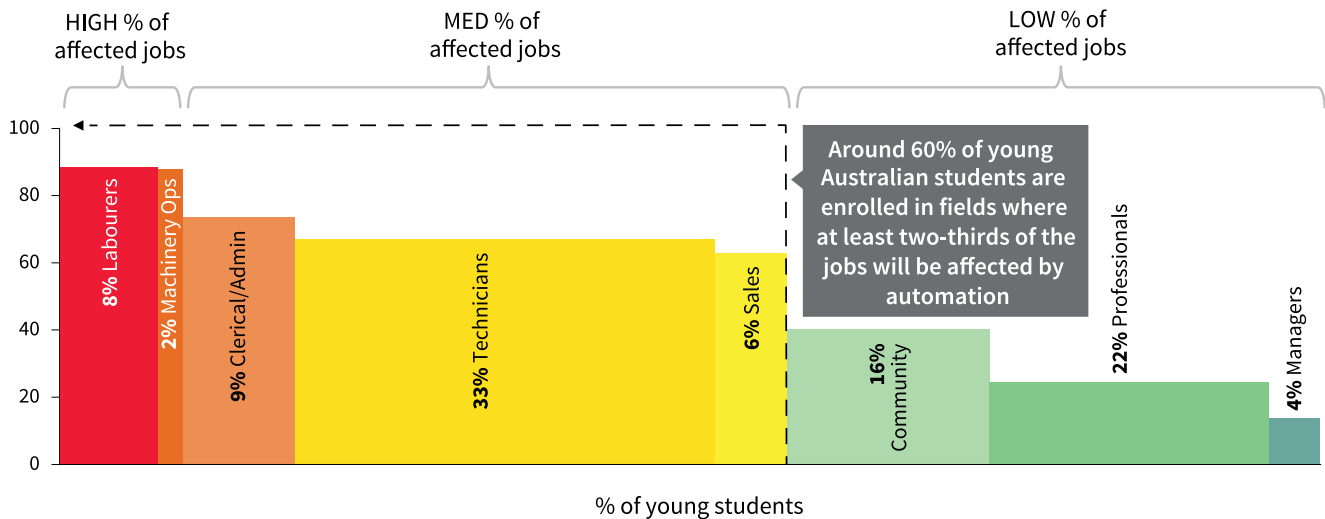


Source: CEDA (2015), ABS and AlphaBeta analysis



**Fig 14. More than half of young Australian students are enrolled in occupations that are dying**

% of jobs that will be affected by automation, width represents proportion of 15-24 yr students enrolled in VET and university courses, 2010-2014



### Youth unemployment?

Globally, there has been significant discussion around the impact of automation on the general workforce. There has been less of a spotlight on the special impact on young people. In first-time analysis for this report, we look at the implications of automation for the education and employment of young people. Specifically, whether automation affects the capacity for young people to secure early work experience and junior roles and whether they are enrolling in the right post-school courses.

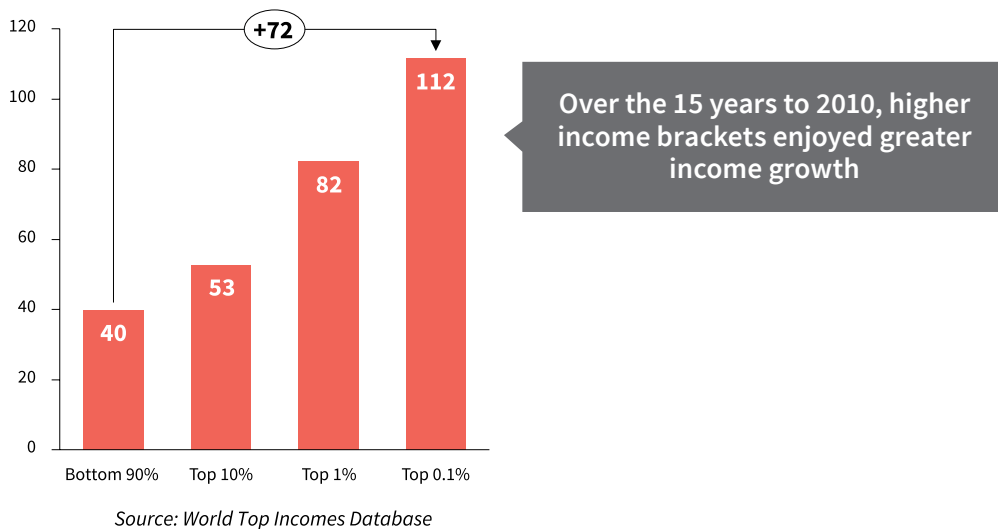
In fact, young people are likely to be disproportionately hurt by automation. Young people tend to get their break into the labour market, or their first few jobs, in occupations that are forecast to be highly affected by automation. As Figure 13 shows, around 70% of young people (15-24 years) in Australia get their foothold in occupations that will be highly affected by automation in the next 10-15 years.<sup>30</sup> Young people tend to get their first jobs in fields like retail, admin, and laboring. These fields are highly exposed to the impact of technology. Economists have forecast that jobs like checkout operators, receptions, personal assistants and fast food workers will either be lost or radically changed by technology. By contrast, young people tend not to get their foothold in the workforce in occupations that are less exposed to automation, such as managers and professionals. Less than 20% of young people are employed in these more secure occupations.

These early work experiences and junior roles often help young people ‘learn to work’. Tomorrow’s young people risk losing the opportunity to gain crucial work experience, employability skills and entry-level roles in the labour force.

Looking to the future, our young people are also not being prepared and educated for the right jobs. In fact, over the past five years, nearly 60% of young Australian students enrolled in fields of study that will be highly affected by automation (see Figure 14). Specifically, 58% of students aged under 25 years in Australia enrolled in fields of study that will be radically affected by automation in the next 10-15 years.<sup>31</sup> If we focus just on VET students, the proportion of students being trained in the at-risk occupations rises to a significant 71%. By way of example, more than half of the jobs in the most common occupation for student enrolments – technicians – are forecast to be radically affected by automation in the next 10-15 years. Such jobs include woods trades, horticulture, and printing. This analysis suggests that our vocational education system might be failing to appropriately prepare young people and we need to seriously assess its utility in the future of work.

**Fig 15. Higher income groups in Australia have enjoyed higher income growth**

% growth in household income (1995-2010), real



## 4.2 INEQUALITY

Globalisation and the primacy of technology has enabled the rise of ‘superstar economics’ or winner takes most. On the globalisation front, the most innovative firms are able to use technology to serve bigger markets, often across geographical boundaries, and thereby take a greater share of revenue. This concentrates the gains in a smaller number of companies and individuals. On the technology front, these large global companies are increasingly driving value creation using technology rather than labour inputs. A comparison of leading information-technology and manufacturing companies in the US, at their peaks, illustrates the diminished role of labour in driving company value.

Many economists worry about these trends because of their impact on inequality. In Australia, we have recently experienced worsening inequality. Higher income brackets, especially the top 10-20%, have enjoyed much higher income growth than other income groups. As a function of this, our gini coefficient (the measure of inequality in the economy) has worsened over the past 15 years from 0.29 to 0.32.

### THE DECLINING ROLE OF LABOUR

#### **Detroit 1990:**

The three largest companies had a combined market value of \$65 billion (real) with 1.2 million workers.

#### **Silicon Valley 2014:**

The three largest companies had a combined market value of \$1.09 trillion with just 137,000 workers.

*“We’re on the precipice of major disruption to how we work and the emergence of a future we can’t even imagine. The real question is how we forge a fundamentally different industrial relations system.”*

*– President, Business Council of Australia, 2015*

Given that the trend in our workforce is towards a higher proportion of temporary and part-time roles, inequality may increase. Analysis by the OECD has shown that the income ratio of the 90th percentile income earner to the 10th percentile income earner in Australia is higher (3.14:1) when all temporary, part-time and full-time jobs are included and lower (2.98:1) when only full-time jobs are included.<sup>32</sup> This is likely to reflect the fact that nonstandard work (part-time, temporary and self-employment) is linked with lower jobs quality. Specifically, the OECD has found that nonstandard workers tend to be worse off in job quality,<sup>33</sup> including:

1. Weaker human capital development due to lower training
2. Lower job security and higher job strain
3. Lower more unstable earnings: slower wage growth, higher instability in earnings and larger wage penalties

Accordingly, the continued rise of temporary, part-time and self-employment is likely to contribute to higher rates of inequality. The proliferation of work on online digital platforms will only intensify this trend. Neither the employers nor the platforms, which explicitly claim to act exclusively as an intermediary or matchmaker, are likely to invest in the human capital of the flexible worker.

## 4.3 INSECURITY

While many workers may appreciate the flexibility of managing a portfolio of opportunities, the movement of work outside of formal firm structures is not without risk. Most notably, many of our current workplace rights and protections are attached to formal industrial relations settings. As people transact directly with one another or manage their working arrangements through online intermediaries, lawyers and government officials are concerned about the loss of workplace protections like compassionate leave, maternity leave, penalty rates, insurance, and workers compensation. Given the complexity of legal classifications of work, workers could be forgiven for not understanding the nature of their employment arrangement. Indeed, the law is untested on many of these new platforms. In the US, law suits have been filed against Instacart (on-demand grocery delivery), Uber (on-demand car transportation) and Homejoy (home cleaning services), variously arguing that workers should be classified as employees and receive overtime pay, workers’ compensation and reimbursements for petrol.

As is currently occurring in the US, the public debate around workers on digital talent platforms will likely to center on how these workers are classified e.g., are they independent contractors or employees? However, as people adopt increasingly complex and sometimes ambiguous working arrangements, some commentators have argued that we need a fundamentally different industrial relations framework and innovation in products and services that protect workers.

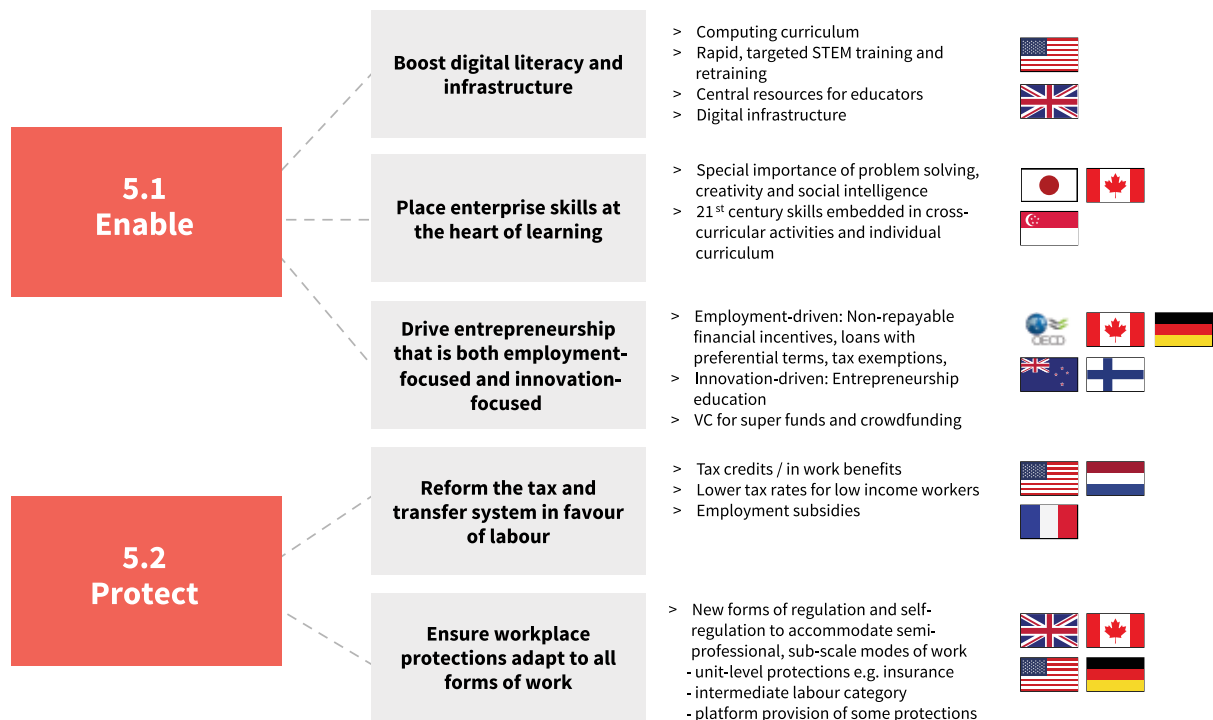
## 5. Policies for driving increased opportunity and reward

---

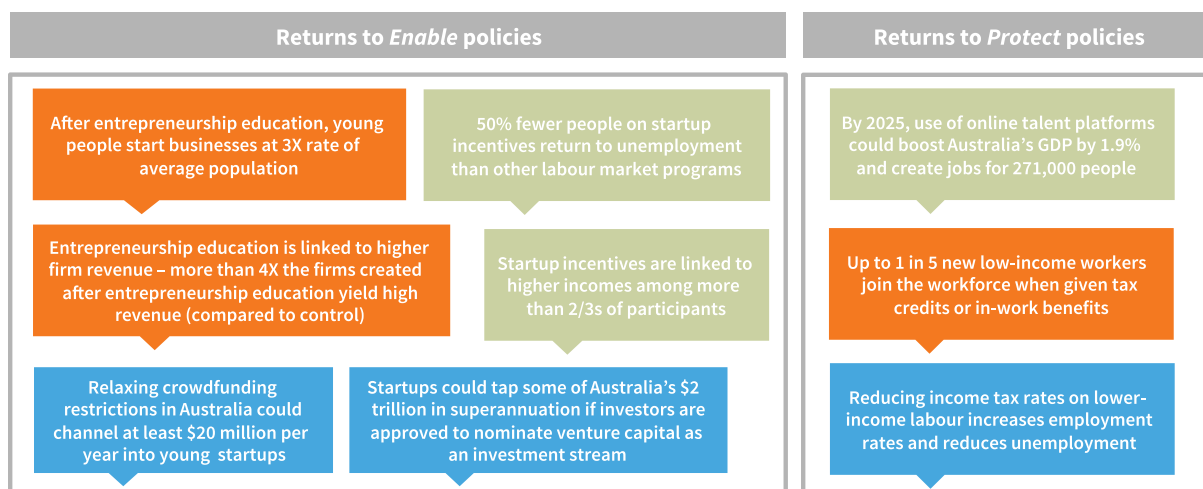
**The challenges and opportunities in the future of work are not unique to Australia. Governments around the world are motivated to ensure their young people are best equipped to succeed. An international scan reveals that policies are targeted *first* towards enabling workers to find opportunity and reward in the future of work and, where enablement reaches its limits, are focused *second* on protecting workers from downside risks.**

This report focuses on select international examples of some illustrative policy options and considers the case for investment. No doubt, there are numerous additional examples of policies that can help mitigate the key future risks and maximize the opportunities. The report has focused on international examples and has not exhaustively reviewed federal and state policies in Australia.

## Policy options and international examples



Globally, these policy options have generated different social and economic returns. Select, illustrative returns are outlined below.<sup>34</sup> Promisingly, the GDP, employment, income and equity impacts of some of the illustrative policy options can be significant.



# 5.1 Policies to enable

## BOOST DIGITAL LITERACY, INCLUDING THROUGH A NEW SCHOOL COMPUTING CURRICULUM

Australian governments could consider:

- > Implementing a mandatory computing or digital technologies curriculum from primary school
- > Ensuring access to digital infrastructure e.g. broadband in all schools and communities

### Case for investment

In order to succeed in a global economy that is digitally enabled, our workforce will need to be increasingly digitally literate. Lack of clarity around the concept of digital literacy has prompted a wide range of contributions to the public debate on digital literacy in schools. At one end of the spectrum, some claim that students will learn what they need through mere exposure as ‘digital natives’ who have grown up with technology. At the other end, others claim that economic growth is at risk unless we graduate swathes of science, technology, engineering and mathematics (STEM) students.

A helpful framework for classifying the digital skills required in our workforce recently emerged as part of the UK Digital Skills Taskforce. In their submission, the UK Forum on Computing Education classified four bands of digital skills<sup>35</sup>:

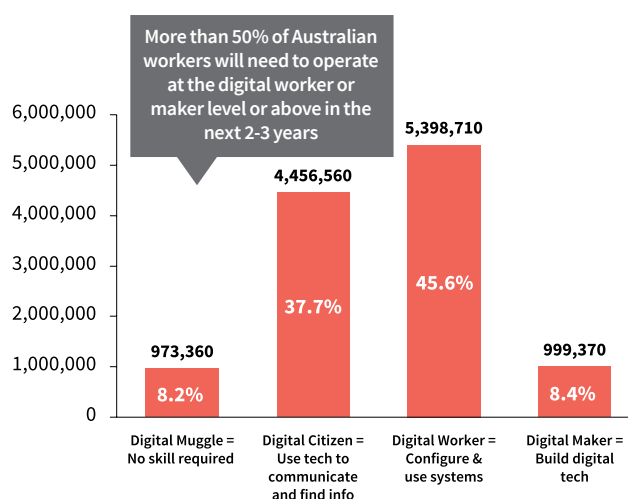
1. **Digital muggle:** no digital skills required
2. **Digital citizen:** use technology to communicate, find information and transact
3. **Digital worker:** configure and use digital systems
4. **Digital maker:** build digital technology

The UK Forum classified what fraction of each of the 300+ occupations in the UK would require these different skill levels in the next 2-5 years.

In first-time analysis for this report, we have used the UK framework and classification of skill level by occupations to analyse the digital skill requirements of 405 occupations in Australia.<sup>36</sup> The analysis shows that more than 90% of Australia’s current workforce will need to be at least a digital citizen to perform their roles in a digitally-enabled economy. More interestingly, approximately 60% of the workforce will ideally be operating at a digital worker level or above.

Fig 16. Australia’s labour force has high digital literacy needs in the next 2-5 years

# of employed persons, Australia






Source: ABS, UK Digital Taskforce, AlphaBeta analysis



## Policy examples from abroad

We can look abroad for instructive examples of ambitious learning programs for students that target competencies at these different levels of digital literacy.

Policy type / target level	Nation	Detail
Computing curriculum  <b>Target level:</b> Digital citizens, workers and makers	United Kingdom  	<b>National computing curriculum</b> <ul style="list-style-type: none"> <li>&gt; Description: Mandatory, industry co-designed computing curriculum in all supported primary and secondary schools.</li> <li>&gt; Objective: Replace prior focus on teaching students how to operate computers with understanding how computers work and how to make computers work for them.<sup>37</sup></li> <li>&gt; <i>"ICT used to focus purely on computer literacy...how to word process, how to work a spreadsheet, how to use programs already creaking into obsolescence... Now, our new curriculum teaches children...not just how to work a computer; but how a computer works, and how to make it work for you."</i> – UK Minister for Education, 2014<sup>1</sup></li> <li>&gt; Stages of curriculum:               <ol style="list-style-type: none"> <li>1. Stage 1 (5-6 year olds): Learn about algorithms as a set of instructions. Create and debug simple programs.</li> <li>2. Stage 2 (7-11 year olds): Create and debug more complex programs. Learn to use internet and devices to collect, analyze and present data.</li> <li>3. Stage 3 (11-14 year olds): Use 2+ programming languages to create own programs. Learn how hardware and software work together.</li> </ol> </li> <li>• Implementation: From September 2014. Networks of master teachers who are training teachers in up to 40 schools, matched funds for training from industry giants like Google, IBM and Microsoft and training tools developed by industry.</li> </ul>
Tools for educators  <b>Target level:</b> Digital citizens	USA  	<b>Digitalliteracy.gov</b> <ul style="list-style-type: none"> <li>&gt; Government portal to make resources available to community practitioners delivering digital literacy training</li> <li>&gt; Who: Federal government interagency working group</li> </ul>
Targeted digital technologies training  <b>Target level:</b> Digital workers and makers	USA  	<b>TechHire<sup>38</sup></b> <ul style="list-style-type: none"> <li>&gt; Initiative in 20 regions to get more Americans, especially disadvantaged individuals, rapidly trained for and placed in existing technology jobs. Three pillars:               <ol style="list-style-type: none"> <li>1. Using online data of job availability and innovative hiring practices to expand prospects for non-traditional hires</li> <li>2. Fund (\$100 million federal government commitment) and offer models for training that prepare students in months, not years</li> <li>3. Local leadership to connect people to jobs, and offer on-ramp programs</li> </ol> </li> </ul>

## Applicability in Australia

These different skill level requirements outlined in Figure 16 speak to the types of skills that need to be taught in our education system. To ensure digital citizenry (using technology to communicate and find information), there must be widespread access and usage of ICT as part of the learning process. Positively, more than 90% of students in all geographic regions and school sectors have access to computers and the internet at school,<sup>39</sup> Australia scored strongly on international tests of digital reading literacy, and ICT is embedded as a general capability in the national curriculum. Access to affordable broadband in homes and communities is essential to function as a digital citizen. As an immediate priority, the 10% of government schools without internet access<sup>40</sup> need to be brought online.

Australia's efforts to ensure sufficient numbers of 'digital makers' are less promising. Concerns about insufficient numbers of STEM graduates are well known, strongly evidenced and do not need to be repeated here.<sup>41</sup>

TechHire in the US is an innovative policy that exemplifies the new types of rapid training and retraining that governments are investing to ensure employers' STEM and digital needs are met. While the focus on STEM is well deserved, it is potentially unduly narrow. As Figure 16 shows, the Australian workforce also needs around 5.4 million 'digital workers'. These will not necessarily be STEM employees, although some will be. Instead, they are workers who understand how to make technology work for them. To grow this skillset, it is worth considering a mandatory computing curriculum in primary and secondary schools. To this end, governments could endorse the newly-developed Digital Technologies curriculum<sup>42</sup> and consider a mandatory rollout in schools from early primary school stages. This report disagrees with the recent Review of the Australian Curriculum that recommends Digital Technologies only be introduced from Year 9. Without doubt, the development of the curriculum is only the first step and will require both high quality initial teacher training and professional development within the existing workforce to see the intended impact in the classroom.

## PLACE ENTERPRISE SKILLS AT THE HEART OF LEARNING

### Australian governments could consider:

- > **Embedding enterprise skills, especially problem solving, creativity and social intelligence, in school curricula as general capabilities and in individual subject curriculum**
- > **Training and promoting teaching methods that support problem solving capabilities**




### Case for investment

Over the past 10 years, the OECD has found that the occupations with the highest proportion of strong performers in problem solving (according to the international survey of adult skills), were the only occupations to enjoy increased share of total employment.<sup>43</sup> Economists have predicted that, over the next two decades, the jobs most unlikely to be automated are those that involve creative intelligence, social intelligence and problem solving. These skills comprise a broader set of skills that have variously been called 21st Century skills, enterprise skills and employability skills.

Such skills include confidence, communication, creativity, project management, enthusiasm for learning, critical thinking, team work, digital literacy, financial literacy and global citizenship. For our young people to secure the jobs of the future, be they manual or cognitive, they will need to exhibit skills in these areas.

- > For non-routine manual jobs, key skills in the jobs of the future that are at low risk of automation include basic problem solving, communication, and interpersonal skills.
- > For non-routine cognitive jobs, key skills in the jobs of the future include complex problem solving, judgement, creativity, social intelligence and persuasion.

## Policy examples from abroad

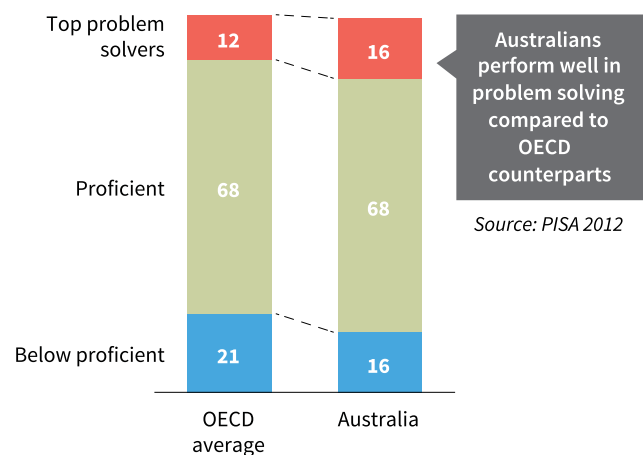
Policy type	Nation	Detail
Cross-curricular problem solving	Japan 	<b>Integrated Learning<sup>44</sup></b> <ul style="list-style-type: none"> <li>&gt; New curricula reduced content load by approximately 30% and increased time for 'integrated learning', where students engage in cross-curricular, problem solving projects. New national assessments in grades 6 and 9 focused on ability to students to apply knowledge in real-world scenarios.</li> <li>&gt; Implementation: Education Ministry introduced guidelines and study lesson examples, drafted with private-sector employees.</li> </ul>
Curriculum redesign	Canada 	<b>Critical thinking, problem solving and decision making<sup>45</sup></b> <ul style="list-style-type: none"> <li>&gt; Alberta undertook curriculum redesign project to better enable students to succeed in knowledge-based economy, with a focus on critical thinking, problem solving and decision making</li> </ul>
Curriculum redesign	Singapore 	<b>21st century competencies</b> <ul style="list-style-type: none"> <li>&gt; Identified 21st century competencies: critical and inventive thinking, communication, collaboration, information skills, global awareness and cross-cultural skills</li> <li>&gt; Developed 21st centuries competencies framework that guides development of national curriculum and school-based programs</li> </ul>

## Applicability in Australia

Positively, Australians perform well in problem solving by international comparison, with a higher proportion of top problem solvers compared to the OECD (16% vs 12%) and fewer who are below proficiency (16% vs 21%).<sup>46</sup> A substantial proportion of our problem solving performance is predicted performance in reading, mathematical and scientific literacy. This is not the case in all countries and suggests that the pedagogical methods with which we teach these foundational skills also promotes problem solving skills. Other policies to promote problem solving capabilities include shifting pedagogical methods in schools and universities away from volume-based rote learning to inquiry-based or experiential learning. International academics have also advocated for ways to ensure than performance assessments test higher order thinking.<sup>47</sup> While we are sympathetic to concerns about curriculum overcrowding, the suggestion to remove general capabilities around creative and critical thinking from the national curriculum is not sound.

**Fig 17. Australian students perform well in problem solving, PISA, 2012**

% of students, by level, Australia and OECD average



## DRIVE BOTH EMPLOYMENT-FOCUSED AND INNOVATION-FOCUSED ENTREPRENEURSHIP

---

### Australian governments could consider:






- > Promoting entrepreneurship as a viable career option to school and tertiary students
  - > Providing strong start-up incentives for young people including income support, grants, loans with preferential terms, tax exemptions and guidance/coaching
  - > Making publically-funded education places in VET and university available to students wishing to undertake entrepreneurship education in facilities run by entrepreneurs
  - > Using public expenditure to drive demand for employment among key groups at risk of non-participation
  - > Providing the option for superannuation accountholders to invest some of the superannuation in a Venture Capital (VC) & Private Equity (PE) innovation stream
  - > Relaxing the constraints around crowdfunding
- 




### Case for investment

The twin forces of globalisation and technology have prompted governments worldwide to encourage entrepreneurship for both employment and innovation objectives. Regarding globalisation, the model of winners-take-most has compelled governments to encourage innovation among their workforces, in the hopes of their nation joining the ranks of ‘winners’. The combined impact of globalisation and automation has also prompted governments to encourage self-employment activities for those who have been displaced or are otherwise struggle to enter the labour market.

### Policy examples from abroad

While discussions around barriers to entrepreneurship often center on financing, entrepreneurship begins well before funding needs arise. Policies should target different barriers, including the need to 1) Stand Up (promote attitudes and skills for mobilizing entrepreneurs); 2) Start up (gathering resources and know-how to start a business); and finally 3) Scale Up (enable businesses to scale, chiefly through financing). Different policies target the different entrepreneurship skills and resources required for employment-based and innovation-based entrepreneurship.

Policy category	Policy type	Nation	Detail
<b>Stand Up</b> Promote attitudes and skills for mobilising entrepreneurs	Awareness raising	Germany 	Raising student awareness of self-employment as a career option: > Germany: “Junior” Project involve entrepreneurship simulation for students 15-20 years including selling equity and product development. Results indicated increased positive attitudes to entrepreneurship and identification with future career path. <sup>48</sup>
	Development of skills	France 	Development of qualities that are required for entrepreneurship, such as creativity, risk taking and personal responsibility: > France: CREA training program designed to foster entrepreneurial skills and culture. Students work with entrepreneurs on implementing their business plans.
<b>Start Up</b> Gather resources and know-how to start a business	Employment-driven	European Comm 	Across a range of European countries, start up incentives that have been deployed by governments to target self-employment (chiefly among the unemployed) included: > non-repayable monetary incentives, > loan programs with preferential terms, > exemptions from tax, and > training and coaching especially in business planning, financing and management. <sup>49</sup>  Evaluations of start-up incentives have found that most of the businesses created enjoy relatively long survival rates but their contribution to employment beyond the target individual is low.  Caveats: Income security measures were found to be more important than loans or subsidies for the business. In order to reduce deadweight loss, the most targeted policies established conditionality around length of unemployment, age, low likelihood of alternative options.
	Innovation-driven	Germany   Finland 	One of the most common and evidenced-based policies for encouraging innovative startups is entrepreneurship education. An analysis of 40+ studies in entrepreneurship education demonstrated links with: > the acquisition of knowledge and skills relevant to starting a business > positive entrepreneurship outcomes and measures, including taking steps towards starting a business, starting a business and financial success. <sup>50</sup>  Entrepreneurship education is less effective, and its effects fade out, if self-employment rather than high-potential innovation is targeted. <b>International examples</b> > Finland: Universities transitioned from educating entrepreneurs, not just professionals. The opportunity to flexibly use their budgets provided Finnish universities to invest in accelerator programs. > Germany: EXIST program: Support students from higher education institutes who want to translate an idea into a business plan and includes funding for the seed phase.

Policy category	Policy type	Nation	Detail
Scale Up Enable businesses to scale, chiefly through financing	Venture capital	USA 	<ul style="list-style-type: none"> <li>&gt; Pension Fund commitment: Approximately 2% of US pension funds are committed to venture capital. Large pension funds in the US, such as the Californian Public Employees Retirement Scheme (CalPERS) routinely invest a not insignificant portion in venture capital funds.</li> <li>&gt; Government co-investment and tax incentives to attract venture capital investment. Yozman program in Israel to attract foreign VC included co-investment, tax incentives and generous option for private investors to buyout Government's interest after five years.<sup>51</sup></li> </ul>
	Crowd-funding	Canada 	<ul style="list-style-type: none"> <li>&gt; Globally, crowdfunding is emerging as an alternative source of financing for startups and SMEs (growing by 50% annually since 2009, albeit still representing a small share of total financing for SMEs)<sup>52</sup></li> </ul>
		NZ 	<ul style="list-style-type: none"> <li>&gt; Both UK and Zealand implemented regulatory regimes mid last year to permit startups and SMEs that are not publically listed to issue some form of equity in their enterprise to large crowds. Canada is currently finalizing its regime.</li> </ul>

### Applicability in Australia Start Up

In some countries, especially European countries,<sup>53</sup> the loss of some low-skilled work has been partially remedied by efforts to boost self-employment or employment-focused entrepreneurship. Similarly, the establishment of the New Enterprise Incentive Scheme in Australia is to be commended.<sup>54</sup> Further programming that provides start-up incentives is recommended. Such programming in Europe has been found to be more effective in reducing unemployment and in slowing the return to unemployment than other labour market policies.<sup>55</sup>

Given the overwhelming rate of enrolment by young people in fields of study that will be highly affected by automation over the next 10-15 years, Australia needs to consider whether our education system is adequately preparing students for the future of work. In particular, our vocational education system is training the vast majority of its students (71%) for occupations where at least two-thirds of the roles will be highly affected by automation in the next 10-15 years. This analysis suggests that our tertiary and VET education systems need reform. In the context of this education and future jobs mismatch, it may be worth exploring whether our tertiary institutions should be more directed at encouraging entrepreneurship, including self-employment. In particular, governments could explore the feasibility of making accessible HECS, FEE HELP, and government-subsidised training in VET to students who participate in entrepreneurship education facilities run by successful entrepreneurs.

Governments could also consider using targeted public expenditure to drive demand for jobs, including for self-employed persons and groups at risk of stepping out of the labour force or not participating.

### Scale Up

One of the key ingredients for scaling a startup is financing. Australia has a deservedly poor reputation for financing late-stage startups. The venture capital market remains underdeveloped; in the 2014 financial year, only \$120 million was raised and none of these funds were for late-stage opportunities.<sup>56</sup> Some commentators have suggested mandating a minimum percentage of superannuation funding for venture capital investment. However, government mandates around investments are generally unsound and distortionary but there is merit in government providing the option for account holders to invest some of their superannuation in an innovation stream that would bundle domestic venture capital and private equity.<sup>57</sup>

In the absence of improved venture capital, Australia should move quickly to facilitate equity crowdfunding. Regulation in Australia currently limit the use of crowdfunding by startups. Specifically, companies are generally prohibited from publically offering equity and debt and shareholder numbers are capped at a relatively small number.<sup>58</sup> If Australia relaxed regulations and enjoyed similar rates of equity crowdfunding as seen last year in the US (despite being available only to accredited investors) and Europe, startups could benefit from around \$20 million per year in additional funding.<sup>59</sup>







## 5.2 Policies to *protect*

### REFORM THE TAX AND TRANSFER SYSTEM IN FAVOUR OF LOW-INCOME LABOUR

Australian governments could consider:

- > Reducing the tax wedge, or the difference between employer payment and take-home pay, by lowering the tax rate on low-income labour
- > Offsetting income tax rates reductions with higher taxes on capital gains and select consumption
- > Increasing initiatives to ‘make work pay’ for low-income workers, including tax credits

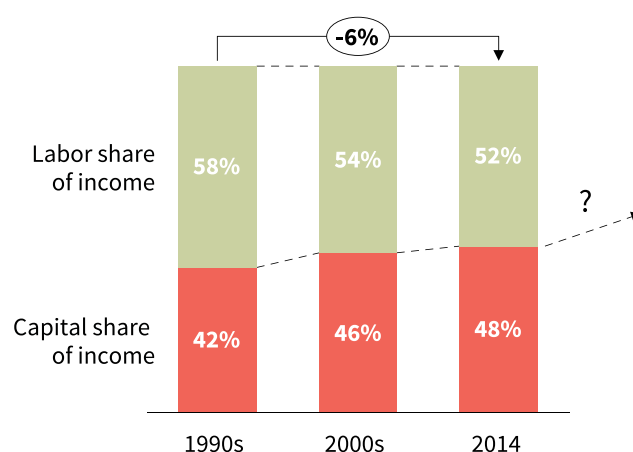
#### Case for investment

Given recent shifts in who is reaping the rewards of economic growth (with labour’s share of total income in Australia declining), low wages growth and consumers capturing much of the internet’s value in higher ‘consumer surplus’, it may be timely to consider a shift in the tax base.




#### Policy examples from abroad

Other countries have taxed labour at lower rates, especially at the low income end, and taxed consumption and capital gains at higher rates. Redistributive measures are also being considered in other countries, with a preference for ‘active’ rather than ‘passive’ spending. The OECD has found that well designed redistribution does not necessarily detract from economic growth. In particular, active spending, which is attached to employment, such as in-work benefits and childcare spending is associated with higher growth than passive spending, such as unemployment benefits.<sup>60</sup>

Fig 18. Share of income for labour is falling  
% of total income share for value added estimates  
of multi-factor productivity, 1990-2014



Source: ABS Cat 5260

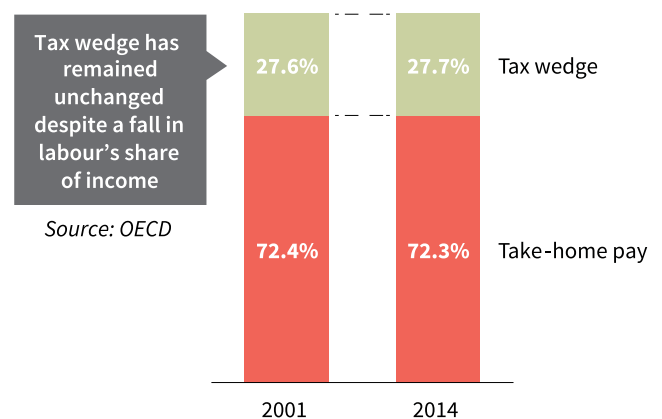
Policy type	Nation	Detail
Tax credits	USA and multiple OECD 	<b>Making Work Pay<sup>61</sup></b> > Credit for people who pay no tax on their labour income to boost their after-tax income. Increases the incomes of low-income workers through the tax and transfer system reduces disincentives for individuals to enter labour market and to increase efforts once in the labour market. Now offered in 17 OECD countries. > Objectives: both redistributive and employment.
Subsidies	France 	<b>Employment subsidies</b> > Reduce costs of hiring labour, especially disadvantaged or low skill groups, for private sector business.
	Netherlands 	> Caveats/Criteria: Need to be closely targeted for employment gains to be sustained. Employment support in private sector leads to better integration than direct job creation in the public sector.
Progressive tax	OECD	More progressive taxation for lower income workers: This type of tax has been found to reduce unemployment and increase the employment rate. <sup>62</sup> These benefits have been found to be most concentrated among low-skill and younger workers.

### Applicability to Australia

Tax reform is again being debated on the national stage in Australia. As part of this debate, it is appropriate to consider whether the tax burden is efficiently and fairly allocated. At present, the tax wedge for labour in Australia (proportion of an employee's take home pay relative to the costs paid by the employer) is substantial, albeit lower than the OECD average.<sup>63</sup> This wedge has remained unchanged over the past 15 years (at around 28%),<sup>64</sup> despite changes in labour's share of total income. One potential policy measure that has been encouraged by the OECD is a reduction in the tax wedge. Adapting the 'making work pay' policies of select OECD countries, some Australian economists have suggested altering the mix of income received via wages and tax credits.<sup>65</sup>

**Fig 19. Tax wedge in Australia has remained constant over the past 15 years**

*Difference between cost to employer and take-home pay of employee*



## ENSURE PROTECTIONS COVER AND ADAPT TO NEW FORMS OF WORK

---

### Australian governments could consider:

- > **Creating an intermediate category of labour between independent contractor and employee**
  - > **Appointing an advisor to government on the freelance economy**
  - > **Encouraging or requiring online digital platforms to self-regulate**
  - > **Promoting the creation of workers benefits and protections that match the ‘unit-level’ of tasks in the freelance economy**
- 

As a nation, we have spent the best part of 150 years embedding worker protections that we consider essential to a modern, fair economy. Governments and international bodies globally are now debating how to respond to the rise of the collaborative and on-demand economies in order to ensure these hard-fought protections are not lost. Clear alternative models have not yet emerged and the on-demand economy remains either in a regulatory grey zone or mired in individual court battles over workers’ legal status.

### Case for investment

The collaborative and on-demand economy raises a number of questions for the protection of workers. On the one hand, workers benefit from digital platforms that enable them to reach new markets and geographies. For workers, these platforms reduce the barriers to entry for workers who want to inexpensively and securely sell their goods and services to both other individuals and businesses, and channel flexible generation of top-up income. They also drive entry back into the labour force for unemployed workers and encourage micro-entrepreneurs who might not otherwise bear the risks involved in an all-or-nothing startup. For consumers, these platforms provide new consumption experiences and ways to improve the customer experience using third party reviews and immediate feedback. Given the importance of providing avenues for employment-focused entrepreneurship in the future of work, we must be careful to ensure that regulation does not crush the promise of these platforms.








While the platforms indeed exhibit great promise, they often operate outside of existing industrial relations structures. Debates are raging worldwide about how to legally classify workers on these platforms and who is required to ensure basic workplace protections, such as insurance and leave entitlements. One response, pursued recently in a non-binding decision by the California Labour Commission regarding an individual Uber driver, is to classify workers as employees of the digital platform.

The challenge with this approach is that it applies regulatory regimes designed for the economics of full-time or larger-scale activity to a small, semi-professional provider. Activity in the collaborative and on-demand economy often blurs the line between the professional and the personal. Typically, participants are not active on the platforms in a full-time capacity<sup>66</sup> and providers are often using their private assets in the transaction (e.g. their home in Airbnb and their car for Uber). Such providers are often not professional hoteliers or drivers. Numerous legal academics have cautioned against imposing regulatory structures designed for traditional providers on the smaller, semi-professional providers that typically comprise these platforms. As one US academic has argued, “There is a real danger that misalignment between newer peer-to-peer business models and older regulations will impede economic growth.”<sup>67</sup>

*“Applying a regulatory regime developed for full-time or large-scale professional providers to smaller, semiprofessional providers could create barriers to entry, stifling peer-to-peer exchange as well as the grassroots innovation that the sharing economy facilitates.”*

– University of Chicago Law Review, 2015

### Policy examples from abroad

Policy type	Nation	Detail
Union for independent contractors	USA 	<ul style="list-style-type: none"> <li>&gt; Peers.org, a membership organisation with approximately 250,000 independent contractors for on-demand firms.</li> <li>&gt; Creates products and services to support workers in collaborative economy.</li> </ul>
Intermediate category of labour	Canada   Germany 	<ul style="list-style-type: none"> <li>&gt; Dependent contractor is a legal category for some workers in Canada, Germany and Spain and was created with reference to economic dependency, where a very small business (often a single person) depended to a large degree on one client/income source.</li> <li>&gt; While not applicable to on-demand economy, because workers do not earn high proportion of income from single client, this category demonstrates the potential for intermediate labour categories between employee and contractor.</li> </ul>
Freelance Ambassador to Govt	United Kingdom 	<ul style="list-style-type: none"> <li>&gt; Late in 2014, David Cameron appointed an Ambassador to the Government for the self-employed, nicknamed the “Freelance Tsar”, to advise the Government on how best to support workers in nontraditional working arrangements.</li> </ul>
Disclosure	USA 	<ul style="list-style-type: none"> <li>&gt; Platforms in Pennsylvania must clearly advise drivers in writing of the impact of commercial driving on their personal insurance, whether the platform has alternately covered them and how to file.<sup>68</sup></li> </ul>
Insurance coverage	USA 	<ul style="list-style-type: none"> <li>&gt; Platform must hold commercial liability insurance policy of a minimum \$1 million per-incident coverage in California.</li> <li>&gt; Platforms in Pennsylvania must hold commercial liability insurance that varies coverage at different points of driving transaction.<sup>69</sup></li> </ul>
Training provision	USA 	<ul style="list-style-type: none"> <li>&gt; Platforms must provide driver training in California.<sup>70</sup></li> </ul>

### Applicability in Australia

Australian state and federal governments need to thoughtfully consider how to simultaneously encourage and protect workers in the collaborative economy. As a first step, Australia could consider a similar appointment as David Cameron's "Freelance Tsar" in the UK, to serve as an advisor to governments on this issue. In its upcoming Inquiry into the Workplace Relations Framework, the Productivity Commission could consider the collaborative and on-demand economy and make recommendations on regulatory approaches, including self-regulation. Specifically, the Productivity Commission could consider the possibility of an intermediate category of labour. Some international legal academics are suggesting a new intermediate category of worker be established, between employee and independent contractor, to cover workers in the collaborative economy.<sup>71</sup>

Some international regulatory examples, like provision of driver training and the platform's provision of commercial experience, seem reasonable and could be adopted in Australia. In fact, the digital talent platforms could consider supporting the establishment of an independent benefits platform, as advocated by the CEO of Peers.org. Workers would select protections and make payments in a pro-rated manner that matches the units of work that they perform. The costs of such a platform could be shared among the employers, workers and the platforms themselves.

### FOUR TYPES OF SELF-REGULATION

- 1. Voluntary self-regulation:**  
No government involvement or mandates
- 2. Coerced self-regulation:**  
Industry formulates rules due to threat of government regulation
- 3. Sanctioned self-regulation:**  
Industry formulates rules subject to government approval
- 4. Mandated self-regulation:**  
Government requires industry to establish a self-regulatory framework

***"Right now we have a binary world of contractors versus employees. Creating something more responsive and flexible would provide more options for companies and workers."***

*– Shelby Clark, CEO Peers.org*

In other areas, the path forward is less clear. Rather than impose all existing regulatory regimes on these platforms, some international legal academics have instead recommended that these intermediaries and marketplaces engage in self-regulation.<sup>72</sup> While self-regulation has been primarily proposed in the context of consumer protection, there may also be potential in workplace protections. Given the likelihood that state and federal governments in Australia will otherwise move towards a regulatory position, which may or may not optimally support the sector, the industry could opt for sanctioned self-regulation (see Box for types of regulation). Similar to the way in which many of these platforms have built in controls for consumer protection, they could build in controls and processes for worker protection. By way of example, a self-regulating organisation could provide clear explanation and disclosure of employment status, require its platforms to purchase commercial liability insurance and provide clear explanation of easy, inexpensive ways for its providers to purchase workers compensation.

The future of work presents incredible opportunity for young Australians but also substantial risks. Careful policy design can help us amplify the opportunities and mitigate the risks. We can help equip our young people with the skills and expertise for the jobs of the future, not the past. In so doing, we can ensure that more young Australians see the future of work as a bright future in which they can find opportunity and reward.

# End notes

<sup>1</sup> Unless stated otherwise, this report classifies young people as aged 15-24 years.

<sup>2</sup> Author calculations by multiplying the change in the share of total employment in these occupation by the current size of the labour force

<sup>3</sup> Author calculations using ABS labour force data, catalogue 6291.0.55.003

<sup>4</sup> Author calculation using ABS Catalogue 6291.0.55.001, June 2015 figures.

<sup>5</sup> Durrant-Whyte, H. McCalman, L. O'Callaghan, S. Reid, A. and Steinberg, D. "The Committee for Economic Development of Australia" (CEDA), (2015), Australia's Future Workforce, Ch. 1.4, pp. 60. Available from: <[http://adminpanel.ceda.com.au/FOLDERS/Service/Files/Documents/26792~Futureworkforce\\_June2015.pdf](http://adminpanel.ceda.com.au/FOLDERS/Service/Files/Documents/26792~Futureworkforce_June2015.pdf)>

<sup>6</sup> Data sources: NCVER enrolment data by occupation by age from NCVER Collection "VET students by industry". Available at <http://data.ncver.edu.au/resources/vsi.html#Occupation>; university enrolment data from Department for Education, (2015). Higher Education Statistics: Student Data 2010-2014. Available at <http://www.education.gov.au/student-data>; and data on jobs affected by automation from Durrant-Whyte, H. McCalman, L. O'Callaghan, S. Reid, A. and Steinberg, D. "The Committee for Economic Development of Australia" (CEDA), (2015), Australia's Future Workforce, Ch. 1.4

Methodology: The number of VET student enrolments and the number apprentices & trainees in-training by occupation and age have been obtained from the NCVER. This data is for the 2010-2014 period. For each occupation, the enrolments, apprentices and trainees within the under-25 age bracket have been summed to give the number of young students in-training for each occupation. The number of university enrolments by age across the same period have been obtained from the Department of Education & Training and the number of students in the same under-25 age bracket have been added to the 'Professionals' occupation major group. The chances of automation for each occupational major group have been obtained from the Centre for Economic Development of Australia and the percentages have been applied to the number of young students in-training in each occupational major group. This gives an indication of the number of young students in-training in each occupational major group that will have their jobs affected by automation within the next 10-15 years. By collating these numbers across each of the eight occupational major groups (defined by ANZSCO) the total number of enrolments, apprentices and trainees has been found. This analysis has been conducted for both Australia and NSW. The results show 57% of the enrolments, apprentices and trainees in NSW are in occupations that have at least a 63% chance of being affected by automation. The corresponding figure for Australia is 58%.

<sup>7</sup> Farrell, D., Laboissière, M., Pascal, R., Rosenfeld, J., de Segundo, C and Stürze, S (2005), McKinsey & Company, 'McKinsey Global Report', Part I: The Emerging Global Labor Market: The Demand for Offshore Talent in Services.

<sup>8</sup> OECD, (2015), In It Together: Why Less Inequality Benefits All, OECD Publishing, Paris

<sup>9</sup> Edelman, D. J. (2014), "Freelancing in Australia Study – Results Deck", A National Survey of the new Workforce, sld 7. Available from: <<http://www.slideshare.net/oDesk/freelancing-in-australia-a-national-survey-of-the-new-workforce-40284354>>

<sup>10</sup> MGI, (2015) Online Talent. A labor mark that works. McKinsey Global Institute.

<sup>11</sup> Author calculations using ABS labour force data, catalogue 6291.0.55.003

<sup>12</sup> Methodology: The proportions of young Australians (aged 15-24) to all Australians employed in each of the 8 occupational major groups have been derived from ABS data. These proportions have then been applied to the distribution of the NSW workforce across the 8 occupational major groups to give the number of 15-24 year olds employed in NSW in each of the 8 major groups. The chances of automation for each occupational major group have been obtained from the Centre for Economic Development of Australia and the percentages have been applied to the number of 15-24 year olds employed in NSW in each of the 8 major groups. This analysis gives an indication of proportion of 15-24 year olds employed in NSW that will have their jobs affected by automation within the next 10-15 years. The results show that 68% of the NSW workforce aged between 15 and 24 are in occupations that have at least a 63% chance of being affected by automation within the next 10-15 years.

<sup>13</sup> Paris School of Economics. The World Top Incomes Database. <http://topincomes.parisschoolofeconomics.eu/>

<sup>14</sup> OECD, (2015), In It Together: Why Less Inequality Benefits all, OECD Publishing, Paris, pp. 48. Available from: <[http://www.keepeek.com/Digital-Asset-Management/oecd/employment/in-it-together-why-less-inequality-benefits-all\\_9789264235120-en#page50](http://www.keepeek.com/Digital-Asset-Management/oecd/employment/in-it-together-why-less-inequality-benefits-all_9789264235120-en#page50)> [Accessed: 13 July 2015]

<sup>15</sup> For returns on startup incentives, see European Commission (2014) Activating jobseekers through entrepreneurship. Available at <http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=2177&furtherNews=yes>

For impact of online talent platform, see McKinsey Global institute (2015) A Labor Market that works, Available at [http://www.mckinsey.com/insights/mgi/research/labor\\_markets](http://www.mckinsey.com/insights/mgi/research/labor_markets)

For impact of tax credits, see <http://www.nber.org/papers/w11729.pdf>

For impact of entrepreneurship education, see European Commission (2015) Entrepreneurship education: the road to success. Available at: [http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/education-training-entrepreneurship/index\\_en.htm](http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/education-training-entrepreneurship/index_en.htm)

<sup>16</sup> Autor, D. (2010). "The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings", Center for American Progress and the Hamilton Project

<sup>17</sup> Author calculations using ABS Catalogue 6291.0.55.003 and subtracting the average total growth in the labour force from the growth in number of jobs in each ANZSCO major occupation category.

<sup>18</sup> BCG and The Network (2014) Decoding Global Talent. Available at [https://www.bcgperspectives.com/content/articles/human\\_resources\\_leadership\\_decoding\\_global\\_talent/?chapter=2#chapter2](https://www.bcgperspectives.com/content/articles/human_resources_leadership_decoding_global_talent/?chapter=2#chapter2)

<sup>19</sup> Friedman Tim (2005) "The World is Flat" Farrer, Straus and Giroux

<sup>20</sup> Farrell, D. Laboissière, M. Pascal, R. Rosenfeld, J. de Segundo, C. and Stürze, S. (2005), McKinsey & Company, 'McKinsey Global Report', Part I: The Emerging Global Labor Market: The Demand for Offshore Talent in Services. Available from: <[http://www.mckinsey.com/insights/employment\\_and\\_growth/the\\_emerging\\_global\\_labor\\_market\\_demand\\_for\\_offshore\\_talent](http://www.mckinsey.com/insights/employment_and_growth/the_emerging_global_labor_market_demand_for_offshore_talent)> [Accessed: 21 July 2015]

<sup>21</sup> Yahoo. May 5, 2014 "Aussies outsourcing online"

<sup>22</sup> OECD, (2015), In It Together: Why Less Inequality Benefits All, OECD Publishing, Paris

<sup>23</sup> Edelman, D. J., (2014), "Freelancing in Australia Study – Results Deck", A National Survey of the new Workforce, sld 7. Available from: <<http://www.slideshare.net/oDesk/freelancing-in-australia-a-national-survey-of-the-new-workforce-40284354>>

# End notes

<sup>24</sup> Financial Times- Telefonica (2013) Global Millennium Survey. Available at <http://www.publicpolicy.telefonica.com/blogs/blog/2013/06/13/financial-times-telefonica-millennials-summit-outcomes/>

<sup>25</sup> Golden, L., Henley, J. and Lambert, S. (2013) "Work Flexibility: A Contributor to Happiness"

<sup>26</sup> Schawbel D (2015) Why workplace flexibility is the linchpin to employee happiness. Forbes, 29 June 2015. Available at [http://www.forbes.com/sites/danschawbel/2015/06/29/why-workplace-flexibility-is-the-linchpin-to-employee-happiness/?utm\\_campaign=Forbes&utm\\_source=TWITTER&utm\\_medium=social&utm\\_channel=Entrepreneurs&linkId=15197699](http://www.forbes.com/sites/danschawbel/2015/06/29/why-workplace-flexibility-is-the-linchpin-to-employee-happiness/?utm_campaign=Forbes&utm_source=TWITTER&utm_medium=social&utm_channel=Entrepreneurs&linkId=15197699)

<sup>27</sup> University of Melbourne (2015) HILDA Survey: Selected findings from wave 1 to 12

<sup>28</sup> Summers, L. H., (2015), "Lawrence H. Summers", Robots are Hurting Middle Class Workers. Available from: <http://larrysummers.com/2015/03/03/3977/>

<sup>29</sup> Strategic Economic Decisions (2015) Intelligent machines and the future of employment Number 135

<sup>30</sup> Methodology: The proportions of young Australians (aged 15-24) to all Australians employed in each of the 8 occupational major groups have been derived from ABS data. These proportions have then been applied to the distribution of the NSW workforce across the 8 occupational major groups to give the number of 15-24 year olds employed in NSW in each of the 8 major groups. The chances of automation for each occupational major group have been obtained from the Centre for Economic Development of Australia and the percentages have been applied to the number of 15-24 year olds employed in NSW in each of the 8 major groups. This analysis gives an indication of proportion of 15-24 year olds employed in NSW that will have their jobs affected by automation within the next 10-15 years. The results show that 68% of the NSW workforce aged between 15 and 24 are in occupations that have at least a 63% chance of being affected by automation within the next 10-15 years.

<sup>31</sup> Author calculations using: NCVER enrolment data by occupation by age from NCVER Collection "VET students by industry". Available at <http://data.ncver.edu.au/resources/vsi.html#Occupation>; university enrolment data from Department for Education, (2015). Higher Education Statistics: Student Data 2010-2014. Available at <http://www.education.gov.au/student-data>; and data on jobs affected by automation from Durrant-Whyte, H. McCalman, L. O'Callaghan, S. Reid, A. and Steinberg, D. "The Committee for Economic Development of Australia" (CEDA), (2015), Australia's Future Workforce, Ch. 1.4

<sup>32</sup> OECD, (2015), OECD Employment Outlook 2015, OECD Publishing, Paris, pp. 89

<sup>33</sup> OECD, (2015), In It Together: Why Less Inequality Benefits All, OECD Publishing, Paris

<sup>34</sup> For returns on startup incentives, see European Commission (2014) Activating jobseekers through entrepreneurship. Available at <http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=2177&furtherNews=yes>

For impact of online talent platform, see McKinsey Global Institute (2015) A Labor Market that works, Available at [http://www.mckinsey.com/insights/mgi/research/labor\\_markets](http://www.mckinsey.com/insights/mgi/research/labor_markets)

For impact of tax credits, see <http://www.nber.org/papers/w11729.pdf>

For impact of entrepreneurship education, see European Commission (2015) Entrepreneurship education: the road to success. Available at: [http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/education-training-entrepreneurship/index\\_en.htm](http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/education-training-entrepreneurship/index_en.htm)

<sup>35</sup> Mairs, C., (2014), 'UK Forum for Computing Education', UKForCE Submission to Maggie Philbin's Digital Task Force. Available from: <http://ukforce.org.uk/ukforce/ukforce-submission-to-maggie-philbins-digital-task-force/>

<sup>36</sup> Methodology: The distribution of employment across each occupational unit in Australia has been obtained from the ABS. The data is for the May 2015 quarter and is accurate to the nearest thousand. The spread digital skills required for each occupation has been obtained from a parallel study for the UK workforce by the UK Digital Taskforce. The spread of digital skills required for each occupation has been applied to the distribution of employment for Australia to determine the spread of digital skills required across the entire Australian workforce. This analysis has found that 54% of the Australian workforce must have the skills of a 'digital worker' or 'digital maker' within the next 2-5 years

<sup>37</sup> Department for Education, (2013), "National Curriculum in England" Computing Programmes of Study. Available from: <https://www.gov.uk/government/publications/national-curriculum-in-england-computing-programmes-of-study/national-curriculum-in-england-computing-programmes-of-study> [Accessed: 23 July 2015]

<sup>38</sup> White House (2015) Fact Sheet: Techhire <https://www.whitehouse.gov/the-press-office/2015/03/09/fact-sheet-president-obama-launches-new-techhire-initiative>

<sup>39</sup> De Bortoli, L. and Thomson, S., (2012) "Australian Council for Educational Research", Preparing Australian Students for the Digital World: Results from the PISA 2009 Digital Reading Literacy Assessment, ch. 3, pp. 41. Available from: <http://research.acer.edu.au/cgi/viewcontent.cgi?article=1010&context=ozpisa>

<sup>40</sup> De Bortoli, L. and Thomson, S., (2012) "Australian Council for Educational Research", Preparing Australian Students for the Digital World: Results from the PISA 2009 Digital Reading Literacy Assessment, ch. 3, pp. 41. Available from: <http://research.acer.edu.au/cgi/viewcontent.cgi?article=1010&context=ozpisa>

<sup>41</sup> Office of the Chief Scientist, (2014), "Australian Government, Chief Scientist", Science, Technology, Engineering and Mathematics: Australia's Future. Available from: [http://www.chiefscientist.gov.au/wp-content/uploads/STEM\\_AustraliasFuture\\_Sept2014\\_Web.pdf](http://www.chiefscientist.gov.au/wp-content/uploads/STEM_AustraliasFuture_Sept2014_Web.pdf)

<sup>42</sup> Australian Curriculum, "Digital Technologies", The Australian Curriculum: Digital Technologies. Available from: <http://www.australiancurriculum.edu.au/technologies/digital-technologies/curriculum/f-10?layout=1>

<sup>43</sup> OECD, (2012), "PISA 2012 Results: Creative Problem Solving", Students' skills in Tackling Real-Life Problems, pp. 118. Available from: <http://www.oecd.org/pisa/keyfindings/PISA-2012-results-volume-V.pdf>

<sup>44</sup> OECD, (2012), "PISA 2012 Results: Creative Problem Solving", Students' skills in Tackling Real-Life Problems, pp. 124. Available from: <http://www.oecd.org/pisa/keyfindings/PISA-2012-results-volume-V.pdf>

<sup>45</sup> OECD, (2012), "PISA 2012 Results: Creative Problem Solving", Students' skills in Tackling Real-Life Problems, pp. 120. Available from: <http://www.oecd.org/pisa/keyfindings/PISA-2012-results-volume-V.pdf>

<sup>46</sup> OECD, (2012), "PISA 2012 Results: Creative Problem Solving", Students' skills in Tackling Real-Life Problems, pp. 120. Available from: <http://www.oecd.org/pisa/keyfindings/PISA-2012-results-volume-V.pdf>

<sup>47</sup> Darling-Hammond L & Adamson F (2010). "Beyond basic skills: the role of performance assessment in achieving 21st century standards of learning" Stanford Centre for Opportunity Policy in Education. Available at: <https://scale.stanford.edu/system/files/beyond-basic-skills-role-performance-assessment-achieving-21st-century-standards-learning.pdf>



---

<sup>48</sup> European Commission, (2004), "Helping to Create an Entrepreneurial Culture", A Guide on Good Practices in Promoting Entrepreneurial Culture, 4.2, pp. 29. Available from: <[http://www2.spi.pt/pecae/Website/docs/entrepreneurial\\_culture\\_en.pdf](http://www2.spi.pt/pecae/Website/docs/entrepreneurial_culture_en.pdf)>

<sup>49</sup> European Commission (2014) Activating jobseekers through entrepreneurship. Available at <http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=2177&furtherNews=yes36>

<sup>50</sup> Davidsson, P., (2012), "The Australian Centre for Entrepreneurship Research", ACE Research Vignette: Can Entrepreneurship be taught?. Available from: <[http://eprints.qut.edu.au/63371/1/029\\_ACE\\_Research\\_Vignette\\_-\\_Can\\_entrepreneurship\\_be\\_taught.pdf](http://eprints.qut.edu.au/63371/1/029_ACE_Research_Vignette_-_Can_entrepreneurship_be_taught.pdf)>

<sup>51</sup> The Treasury and the Department of Industry, Innovation, Science, Research and Tertiary Education, (2012), "A Report for the Australian Government", Review of Venture Capital and Entrepreneurial Skills, Appendix C, Sect. C.20, pp. 55. Available from: <<https://www.avcal.com.au/documents/item/516>> [Accessed: 23 July 2015]

<sup>52</sup> Financial System Inquiry, (2014), Financial System Inquiry Final Report, Financial System Inquiry, Ch. 3, Crowdfunding, pp. 177. Available from: <<http://fsi.gov.au/publications/final-report/chapter-3/crowdfunding/>> [Accessed: 19 July 2015]

<sup>53</sup> European Commission (2014) Activating jobseekers through entrepreneurship. Available at <http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=2177&furtherNews=yes36>

<sup>54</sup> Australian Government, (2015), New Enterprise Incentive Scheme (NEIS), Australian Government Department of Employment. Available from: <<https://employment.gov.au/new-enterprise-incentive-scheme-neis>> [Accessed: 21 July 2015]

<sup>55</sup> European Commission (2014) Activating jobseekers through entrepreneurship. Available at <http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=2177&furtherNews=yes36>

<sup>56</sup> El-Ansary, Y. and Zekulich, B. (2014), Australian Private Equity and Venture Capital Activity Report, Australian Private Equity and Venture Capital Association Limited, Fundraising Activity, pp. 19. Available from: <<https://www.avcal.com.au/documents/item/958>>

<sup>57</sup> Rose, S., (2015), "Venture Capitalists Target Super Fund Members and SMSFs", The Sydney Morning Herald, 12 June. Available from: <<http://www.smh.com.au/business/banking-and-finance/venture-capitalists-target-super-fund-members-and-smsfs-20150611-ghlcdc.html>> [Accessed: 25 July 2015]

<sup>58</sup> Financial System Inquiry, (2014), Financial System Inquiry Final Report, Financial System Inquiry, Ch. 3, Crowdfunding, pp. 177. Available from: <<http://fsi.gov.au/publications/final-report/chapter-3/crowdfunding/>> [Accessed: 19 July 2015]

<sup>59</sup> Calculation based on size of equity crowdfunding in the US of around \$300 million, or 4% of total crowdfunding. Equity crowdfunding in Europe is 4-6% of total crowdfunding in recent years. Available from: <<http://blog.gust.com/2015/05/04/us-crowdfunding-in-2014/>>

<sup>60</sup> OECD, (2015), In It Together: Why Less Inequality Benefits all, OECD Publishing, Paris, pp. 48. Available from: <[http://www.keepeek.com/Digital-Asset-Management/oecd/employment/in-it-together-why-less-inequality-benefits-all\\_9789264235120-en#page50](http://www.keepeek.com/Digital-Asset-Management/oecd/employment/in-it-together-why-less-inequality-benefits-all_9789264235120-en#page50)> [Accessed: 13 July 2015]

<sup>61</sup> OECD, (2011), Tax Reform Trends in OECD Countries, OECD 50th Anniversary, Challenges in Designing Competitive Tax Systems. Available from: <<http://www.oecd.org/ctp/48193734.pdf>>

<sup>62</sup> Institute for the Study of Labor (2014) Beyond the labour income tax wedge. Discussion Paper No. 8276

<sup>63</sup> OECD, (2014), Taxing Wages: Tax Burden on Labour Income in 2014 and Recent Trends, OECD. Available from: <<http://www.oecd.org/ctp/tax-policy/taxing-wages-tax-burden-trends-latest-year.htm>> [Accessed: 24 July 2015]

<sup>64</sup> <http://www.oecd.org/australia/taxingwages-australia.htm>

<sup>65</sup> Some economists have suggested that the minimum wage could be lowered and accompanied by tax credits to redistribute income. See Australian Government, (2015), Workplace Relations Framework: The Inquiry in Context, Australian Government, Productivity Commission Issues Paper 1, Ch. 1.2, pp. 7. Available from: <<http://www.pc.gov.au/inquiries/current/workplace-relations/issues/workplace-relations-issues-combined.pdf>>

<sup>66</sup> A high percentage of US Lyft and Uber drivers are not active on the platform for more than 15 hours per week. Only one in five sellers on Etsy consider their Etsy activity to constitute a full-time job. Further information available from: <[https://lawreview.uchicago.edu/sites/lawreview.uchicago.edu/files/uploads/Dialogue/Sundararajan\\_Cohen\\_Dialogue.pdf](https://lawreview.uchicago.edu/sites/lawreview.uchicago.edu/files/uploads/Dialogue/Sundararajan_Cohen_Dialogue.pdf)>

<sup>67</sup> Sundararajan, A. (2014), "Trusting the 'Sharing Economy' to Regulate Itself", The New York Times, 3 March. Available from: <[http://economix.blogs.nytimes.com/2014/03/03/trusting-the-sharing-economy-to-regulate-itself/?\\_r=0](http://economix.blogs.nytimes.com/2014/03/03/trusting-the-sharing-economy-to-regulate-itself/?_r=0)> [Accessed: 28 July 2015]

<sup>68</sup> Pennsylvania Public Utility Commission, (2014), Combined Joint Motion of Chairman Robert f. Powelson and Commissioner Pamela A. Witmer. Available from: <<http://www.puc.pa.gov/pdocs/1325025.pdf>>

<sup>69</sup> Pennsylvania Public Utility Commission, (2014), Combined Joint Motion of Chairman Robert f. Powelson and Commissioner Pamela A. Witmer. Available from: <<http://www.puc.pa.gov/pdocs/1325025.pdf>>

<sup>70</sup> California Public Utilities Commission, (2013), CPUC Establishes Rules for Transportation Network Companies, California Public Utilities Commission. Available from: <<http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M077/K132/77132276.PDF>>

<sup>71</sup> Weber, L., (2015), "What if There Were a New Type of Worker? Dependent Contractor", The Wall Street Journal, 28 January. Available from: <<http://www.wsj.com/articles/what-if-there-were-a-new-type-of-worker-dependent-contractor-1422405831>> [Accessed: 19 July 2015]

<sup>72</sup> Cohen, M. and Sundararajan, A., (2015), "Self-Regulation and Innovation in the Peer-to-Peer Sharing Economy", The University of Chicago, pp. 121. Available from: <[https://lawreview.uchicago.edu/sites/lawreview.uchicago.edu/files/uploads/Dialogue/Sundararajan\\_Cohen\\_Dialogue.pdf](https://lawreview.uchicago.edu/sites/lawreview.uchicago.edu/files/uploads/Dialogue/Sundararajan_Cohen_Dialogue.pdf)> [Accessed: 17 July 2015]

# Reference list

---

- Acemoglu, D., (1999). Changes in unemployment and wage inequality: An alternative theory and some evidence. *American Economic Review* 89 (5), 1259–1278.
- Acemoglu, D. and Autor, D., (2011). Skills, tasks and technologies: Implications for employment and earnings. In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics*, Volume 4B, Chapter 12, pp. 1043–1171. Elsevier.
- Andersson, F., Haltiwanger, J.C. Kutzbach, M.J, Pollakowski, H.O., and Weinberg, D.H., (2014). Job Displacement and the Duration of Joblessness: The Role of Spatial Mismatch, NBER Working Papers 20066, National Bureau of Economic Research, Inc.
- Australian Curriculum, “Digital Technologies”, The Australian Curriculum: Digital Technologies.
- Australian Government, (2015), New Enterprise Incentive Scheme (NEIS), Australian Government Department of Employment.
- Australian Government, (2015), Workplace Relations Framework: The Inquiry in Context, Australian Government, Productivity Commission Issues Paper 1, Ch. 1.2
- Autor, D., (2014). Skills, Education, and the Rise of Earnings Inequality Among the ‘Other 99 Percent’, *Science*, 344 (6186) pp. 843–851.
- Autor, D., (2010). “The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings”, Center for American Progress and the Hamilton Project.
- Autor, D. and Dorn, D., (2013). The growth of low skill service jobs and the polarisation of the US labor market. *American Economic Review*. vol. 103(5), pp. 1553–97.
- Autor, D., (2010, April). The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings. Center for American Progress and The Hamilton Project.
- Autor, D. H., L. F. Katz, and M. S. Kearney (2006). The polarization of the US labor market. *American Economic Review: Papers & Proceedings* 96 (2), 189–194.
- Autor, D. H., F. Levy, and Murnane, R. J., (2003). The skill content of recent technological change: An empirical exploration. *Quarterly Journal of Economics* 118 (4), 1279–1333. Bernanke, B. S. (2003). The jobless recovery. <http://www.federalreserve.gov/boarddocs/speeches/2003/200311062/default.htm>.
- Bernanke, B. S., (2009). On the outlook for the economy and policy.
- Brynjolfsson, E. and McAfee, A., (2011). *Race Against The Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*. Digital Frontier Press.
- California Public Utilities Commission, (2013), CPUC Establishes Rules for Transportation Network Companies, California Public Utilities Commission.
- Centre for Economic Development of Australia (2015) *Australia’s Future Workforce*
- Cohen, M., and Sundararajan, A., (2015), “Self-Regulation and Innovation in the Peer-to-Peer Sharing Economy”, The University of Chicago, pp. 121.
- D’Arcy & Gardiner, (2014) *Just the job – or a working compromise: The changing nature of self-employment in the UK*. Resolution Foundation.
- Davidsson, P., (2012), “The Australian Centre for Entrepreneurship Research”, ACE Research Vignette: Can Entrepreneurship be taught?.
- De Bortoli, L. and Thomson, S., (2012) “Australian Council for Educational Research”, *Preparing Australian Students for the Digital World: Results from the PISA 2009 Digital Reading Literacy Assessment*, ch. 3
- Department for Education, (2013), “National Curriculum in England” Computing Programmes of Study.
- Durrant-Whyte, H., McCalman, L., O’Callaghan, S., Reid, A. and Steinberg, D., (2015), “The Committee for Economic Development of Australia” (CEDA), *Australia’s Future Workforce*, ch. 1.4
- Dellot, B., (2014) *The Salvation in a Start-up? The origins and nature of the selfemployment boom*. RSA.
- Edelman, D. J., (2014), “Freelancing in Australia Study – Results Deck”, A National Survey of the new Workforce, sld 7.
- El-Ansary, Y. and Zekulich, B., (2014), *Australian Private Equity and Venture Capital Activity Report*, Australian Private Equity and Venture Capital Association Limited, Fundraising Activity
- Elsby, Hobijn, Sahin, *The decline in the US labor share*. Brookings Institution.
- European Commission, (2004), “Helping to Create an Entrepreneurial Culture”, *A Guide on Good Practices in Promoting Entrepreneurial Culture*, 4.2
- Fairlie, R. W., (2013). Entrepreneurship, Economic Conditions, and the Great Recession, *Journal of Economics & Management Strategy*, 22(2), pp. 207–231, 06.
- Farrell, D., Laboissière, M, Pascal, R, Rosenfeld, J, de Segundo, C and Stürze, S (2005), McKinsey & Company, ‘McKinsey Global Report’, Part I: *The Emerging Global Labor Market: The Demand for Offshore Talent in Services*.
- Financial System Inquiry, (2014), *Financial System Inquiry Final Report*, Financial System Inquiry, Ch. 3, Crowdfunding
- Fletcher & Guttman (2013) *Income inequality in Australia*. Economic Roundup Issue 2, 2013.
- Frey & Osborne (2015) *Technology at work: the future of innovation and employment*. Oxford Martin School and Citi.
- Frey, C.B., (2014a). *Creative Destruction at Work*, Project Syndicate, 15 July 2014.
- Frey, C.B., (2014b). *How 21st-Century Cities Can Avoid the Fate of 20th-Century Detroit*, *Scientific American*, 22 August 2014.
- Golden, L. Henley J. and Lambert S., (2013) “Work Flexibility: A Contributor to Happiness”.
- Goos, M. and Manning, A. (2007). Lousy and lovely jobs: The rising polarisation of work in Britain. *The Review of Economics and Statistics*, 89(1), pp. 118–133.
- Goos, M., Manning, A. and Salomons, A. (2009). Job polarisation in Europe. *The American Economic Review*, 99(2), pp. 58–63.

- 
- Harvard Business Review (2014) Breaking down the freelance economy.
- Harvard Business Review (2013) The third wave of virtual work.
- Jaimovich, N. and Siu, H.E. (2012). The trend is the cycle: Job polarisation and jobless recoveries. Tech. Rep., NBER Working Paper No. 18334, National Bureau of Economic Research.
- Karabarbounis, L. and Neiman, B. (2013). The Global Decline of the Labor Share, NBER Working Papers 19136, National Bureau of Economic Research, Inc.
- Mairs, C., (2014), 'UK Forum for Computing Education', UKForCE Submission to Maggie Philbin's Digital Task Force.
- Moretti G., The geography of jobs, Stanford Graduate School of Business.
- MBO Partners, (2014) On-demand economy.
- MGI, (2015) Online Talent. A labor mark that works. McKinsey Global Institute.
- MGI, (2012). Help wanted: the future of work in advanced economies. McKinsey Global Institute.
- MGI, (2011). An Economy that Works: Job Creation and America's Future. McKinsey Global Institute.
- OECD, (2012), "PISA 2012 Results: Creative Problem Solving", Students' skills in Tackling Real-Life Problems
- OECD, (2015), OECD Employment Outlook 2015, OECD Publishing, Paris
- OECD, (2012), "PISA 2012 Results: Creative Problem Solving", Students' skills in Tackling Real-Life Problems
- OECD, (2015), In It Together: Why Less Inequality Benefits all, OECD Publishing, Paris
- OECD, (2014), Taxing Wages: Tax Burden on Labour Income in 2014 and Recent Trends, OECD Publishing.
- OECD, (2011), Tax Reform Trends in OECD Countries, OECD 50th Anniversary, Challenges in Designing Competitive Tax Systems.
- Office of the Chief Scientist, (2014), "Australian Government, Chief Scientist", Science, Technology, Engineering and Mathematics: Australia's Future.
- Oxford Martin Commission 2013, Now for the Long Term: The Report of the Oxford Martin Commission for Future Generations, University of Oxford.
- Parhman, D., (2013) Labour's share of growth in income and prosperity. Productivity Commission.
- Pennsylvania Public Utility Commission, (2014), Combined Joint Motion of Chairman Robert f. Powelson and Commissioner Pamela A. Witmer.
- PISA, (2012) Preparing Australian students for the digital world.
- Rose, S., (2015), "Venture Capitalists Target Super Fund Members and SMSFs", The Sydney Morning Herald, 12 June.
- Sachs & Kotlikoff (2012) Smart machines and long-term misery. NBER Working Paper 18629.
- Summers, L. H., (2015), "Lawrence H. Summers", Robots are Hurting Middle Class Workers.
- Summers, L. H., (2014). "Reflections on the new 'Secular Stagnation' hypothesis", VOX, CEPR's Policy Portal.
- Sundararajan, A., (2014), "Trusting the 'Sharing Economy' to Regulate Itself", The New York Times, 3 March.
- The Atlantic. A world without work. July/August 2015 issue.
- The Economist, (2013) Peer-to-peer rental: The rise of the sharing economy. 8 March 2013.
- The Economist, (2014a). New opportunities: Silver lining, 4. October 2014.
- The Economist, (2014b). Measuring inequality: A three-headed hydra, 16 July 2014.
- The Treasury and the Department of Industry, Innovation, Science, Research and Tertiary Education, (2012), "A Report for the Australian Government", Review of Venture Capital and Entrepreneurial Skills, Appendix C, Sect. C.20, pp. 55.
- US Bureau of Labor Studies, Employment Outlook 2020.
- Weber, L., (2015), "What if There Were a New Type of Worker? Dependent Contractor", The Wall Street Journal, 28 January.
- World Economic Forum (2014) Fostering Innovation driven entrepreneurship in Europe.
-



**Foundation for Young Australians**

21-27 Somerset Place, Melbourne VIC 3000

T: 03 9670 5436 E: [info@fya.org.au](mailto:info@fya.org.au)

MELBOURNE / SYDNEY / BRISBANE / DARWIN / PERTH

**[fya.org.au](http://fya.org.au)**

 [/likeFYA](https://www.facebook.com/likeFYA)

 [@fya\\_org](https://twitter.com/fya_org)

 [@fya\\_org](https://www.instagram.com/fya_org)