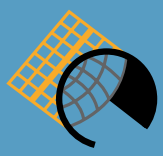
AUSTRALIAN JOURNAL OF LABOUR ECONOMICS

A JOURNAL OF LABOUR ECONOMICS AND LABOUR RELATIONS

Volume 23 • Number 2 • 2020 • ISSN 1328-1143



the **CENTRE** *for*
LABOUR MARKET RESEARCH

AUSTRALIAN JOURNAL OF LABOUR ECONOMICS

A JOURNAL OF LABOUR ECONOMICS AND LABOUR RELATIONS

ISSN 1328-1143

Official Journal of the Australian Society of Labour Economists

Subscriptions and payment
Sandie Rawnsley
Subscriptions Manager
Australian Journal of Labour Economics
Bankwest Curtin Economics Centre
Curtin Business School, Curtin University
GPO Box U1987 Perth WA 6845 Australia

2020 Subscription rates

		*Within Australia**	*International*
1 year	Individual	$146.00	AUD$182.00
	Students	$95.00	AUD$130.00
	Institutions	$196.00	AUD$206.00
3 years	Individual	$358.00	AUD$424.00
	Students	$179.00	AUD$284.00
	Institutions	$513.00	AUD$526.00

* Includes GST

Contact details
Telephone: +61 8 9266 1744
Email: ajle@curtin.edu.au
Webpage: http://businesslaw.curtin.edu.au/our-research/publications/australian-journal-labour-economics/

Contents

AUSTRALIAN JOURNAL OF LABOUR ECONOMICS
Volume 23 • Number 2 • 2020

ISSN 1328-1143

Also available from INFORMIT LIBRARY at: http://search.informit.com.au
and PROQUEST LIBRARY at: http://www.proquest.com

From the Managing Editor

Welcome to the second issue of the *Australian Journal of Labour Economics* (AJLE) for 2020. This year Australia, like every country in the world has experienced one of the biggest shocks to its economy due to the COVID-19 pandemic with enormous impacts on the labour market. Given its importance we have made this issue of AJLE a Special Issue devoted to the effects of COVID-19 on the Australian labour market. This issue covers different aspects of the topic, including the impacts on jobs, policies to reduce unemployment such as JobKeeper, the long-run effects on jobseekers through scarring and the particular impacts on Indigenous Australians. Finally, certain policies which have been proposed to aid recovery of the economy, such as taxation reform and education reform are discussed.

The paper by Rebecca Cassells and Alan Duncan, of the Bankwest Curtin Economics Centre, examines the effectiveness of the JobKeeper program. This analysis provides some important lessons not only for future wage subsidy schemes that are used in similar emergency circumstances, but also in the context of the likelihood of further iterations of the scheme. They point out that while one of the primary goals of JobKeeper was to retain the employer-employee match, enabling businesses to reopen rapidly without having to recruit and train employees, the exclusion of so many workers undermined the ability of the program to achieve this overarching objective. This is particularly relevant within the most affected industries in the service sector, where a critical mass of excluded workers is employed. It is suggested that a better solution for any future emergency wage subsidy would be to keep as many workers in scope as possible.

Gigi Foster, of the University of New South Wales, examines the effects the COVID-19 disruptions has had on Australia's present and future labour force. She finds that the COVID-19 lockdowns have disproportionately affected both jobs and wages in certain industries and have been regressive in their substantially different impacts on workers of different ages. Mid-life workers have been by far the least affected and young workers are disproportionately likely to have dropped out of the labour force. An interesting feature of the paper is the estimation of lifetime losses in income of students as a result of school closures which occurred because of the permanent loss of human capital of school students.

Kailing Shen, of the Australian National University and Bledi Taska, of Burning Glass Technologies (BGT), adopt a novel estimation technique to a data set not usually seen in the labour economics literature. They use data from BGT on job postings to estimate trends in labour demand immediately following the COVID-19 restrictions and in July 2020. Interestingly, they find that the overall labour demand in Australia reached its lowest point in May 2020 but by July it had slowly recovered. Their results also suggest that the impacts of the pandemic are relatively evenly distributed across skill levels, but vary substantially across states, industries and occupations. The results suggest that skill-targeted policies might not be as effective as policies targeted at the state and industry levels to facilitate economic recovery.

The paper by Jeff Borland, of Melbourne University, discusses the effect of 'scarring' due to the huge rise in unemployment, particularly among younger workers, as a result of COVID-19. It is well-known in the labour economics and macroeconomic literature that shocks to the economy have lasting effects on some workers' employment prospects and are not simply reversed when the economy recovers. Jeff does an excellent job explaining the phenomenon, examining the literature and summarising the empirical evidence. From this he draws the conclusion that scarring is going to be a serious consequence of the current employment downturn and suggests policies to ease the long-run deleterious effects on workers.

Yonatan Dinku, Boyd Hunter and Francis Markham, of the Australian National University, examine the short-run and longer-term impacts of the COVID-19 shock on Indigenous Australians. While previous research has indicated the impact of macroeconomic shocks on the Indigenous labour force is limited, their paper suggests that the impacts are significant. Most of the paper is devoted to the impacts on employment in the longer term and they find that may be far more important than the short-run effects. They propose that the COVID-19 economic shock could unwind the labour market gains in closing the gaps between Indigenous and non-Indigenous Australians. This suggests the need for a more radical approach to Indigenous economic policy that takes into account persistent issues such as long-term social exclusion and discrimination.

Tristram Sainsbury and Robert Breunig, of the Tax and Transfer Policy Institute at ANU, make a contribution to the policy debate on how the economy can best recover after the health problems of COVID-19 have been tackled. Politicians and commentators have expressed the need for economic reforms if Australia is going to achieve the economic growth necessary to recover. The authors look specifically at Australia's tax system and whether it is 'fit for purpose' to achieve good economic outcomes. They find that outcomes arising from the current tax system violate the core, broadly agreed upon, tax design principles of equity, efficiency, and simplicity. They put forward a case for comprehensive, structural tax reform to be a central plank in efforts to manage the post-COVID-19 Australian economy.

The final paper by Anne Daly and myself, of the Centre for Labour Market Research at the University of Canberra, looks at a post-recovery policy proposed by the Federal Minister for Education, Dan Tehan, to gear Australia's University student choice of subjects to areas deemed to be relevant to demands of the labour market. The main feature of the proposals was the considerable raising of fees for subjects not considered providing 'job-ready' outcomes while reducing those for subjects that are. While the proposals will no doubt be amended, or even voted down in the Senate, by the time of publication, the fundamentals of the analysis still hold. The paper draws on evidence of employment patterns of new graduates and established graduates in the Australian labour market to assess the economic argument that certain degree disciplines are more 'job ready' than others; the rationale behind 'picking winners'; and the economic case for the proposed funding structure. It concludes that the ideas behind any variant of the proposals are misconceived.

A lot of work has gone into this Special Issue of AJLE, not least by the contributing authors, who deserve thanks for delivering their excellent papers in a

timely fashion. I would also like to thank the co-editors, particularly Anne Daly, Mike Dockery and Boyd Hunter who provided me with exceptional support in the editorial process. Finally, this issue could not have come to fruition without the excellent support of the AJLE's editorial assistant, Sandie Rawnsley. I give her special thanks for her splendid work on the issue.

Phil Lewis
Managing Editor

JobKeeper: The efficacy of Australia's first short-time wage subsidy[a]

Rebecca Cassells* Bankwest Curtin Economics Centre, Curtin University
Alan Duncan Bankwest Curtin Economics Centre, Curtin University

Abstract

The Australian JobKeeper wage subsidy is an unprecedented public policy response to a once in a century health and economic crisis induced by the COVID-19 pandemic. The focus of this paper is on the efficacy of the Australian JobKeeper program design, including how well it meets its overall objective of retaining employer-employee matches; how well it is targeted relative to the needs of both businesses and workers; and the adequacy of JobKeeper as a wage replacement scheme. We consider both the original JobKeeper design, JobKeeper 2.0 and a series of alternative wage subsidy designs that we believe would more effectively target both employers and workers, incentivise a reallocation of labour and support a faster economic recovery.

JEL Codes: J21, J33, J38
Keywords: JobKeeper, wage subsidy, COVID-19 economic crisis, short-time wage subsidy, temporary wage subsidy

[a] Acknowledgments. We are grateful to Michael Kirkness for excellent research assistance. We thank Professor Phil Lewis the Editor of this journal for valuable comments. The views and interpretations presented here are the authors' own and should not be assumed to represent those of our respective institutions or those who have provided comments. Rebecca Cassells is Deputy Director and Alan Duncan is Director of the Bankwest Curtin Economics Centre, Curtin University, Australia.
[*] Corresponding author: Tel: +61 8 9266 1488; Email: rebecca.cassells@curtin.edu.au

1. Introduction

The COVID-19 pandemic not only represents a serious health crisis, it also induced an economic crisis the scale of which has not been seen since the Great Depression. Australia's response was reasonably swift with state leaders playing a pivotal role. Travel bans were the initial focus of early efforts to reduce infections, with quarantine requirements for foreign nationals coming from mainland China, and subsequently Iran, initiated in February and March (Australian Department of Home Affairs, 2020; Australian Department of Health, 2020a). At the end of February, a national emergency health response plan was activated by the Federal government.

The World Health Organization declared COVID-19 a pandemic on 11 March 2020 (World Health Organization, 2020), prompting several state and territory governments to declare a state of emergency, and for further travel restrictions and quarantine rules, along with restrictions on gatherings of over 500 people to be put in place. In just a weeks' time, a ban on non-residents entering Australia (20 March 2020) and non-essential services (21 March 2020) was put in place across the nation (Morrison 2020a; Morrison 2020b).

By this time, Australia's major airline – Qantas had announced that it would stand down two-thirds of their 30,000 employees.[1] Several major Australian companies quickly followed suit, with daily announcements in the final week of March of thousands of workers being stood down.[2] Within just a week, the Australian economy had shed tens of thousands of workers, with estimates of job losses of over 600,000 workers in the immediate fallout, and the unemployment rate rising to 13.1 per cent by August 2020 (Cassells *et al*. 2020).

The speed of the economic contraction has never been seen before, even in the bleakest of downturns. The significant early 1980s and 1990s recessions saw the unemployment rates double, peaking at 10.1 per cent and 11.0 per cent respectively. However, it took two to three years in each downturn for unemployment to reach these heights (Cassells and Duncan 2020a). Even in the Great Depression, the nearest economic shock of any comparable scale to the current COVID-19 pandemic, the unemployment level in Australia took three years from 1929 and 1931 to double from 10 to 20 per cent (Gruen and Clark 2009). This illustrates just how unique and urgent a problem policymakers were facing, particularly as the current downturn was unrelated to any typical business cycle effects but instead induced by the regulatory response to COVID-19.

In response to the economic fallout policy supports were put in place to support households, businesses and workers, all designed and announced in a very short time period. At a federal level, this commenced on the 12 March, with a GFC-style $750 stimulus payment for low income households who were at that time in receipt of specific government payments including Age Pensioners. The merits of the timing of

1 On the 19th March, Qantas announced that it would stand down two-thirds of its 30,000 employees. https://www.abc.net.au/news/2020-03-19/qantas-to-stand-down-two-thirds-of-employees-due-to-coronavirus/12069876

2 This included Star Entertainment Group standing down 9,000 workers; Viva Leisure over 1,000; Myer 10,000; Mosaic Brands 7,000; Flight Centre Travel Group 3,800; Premier Investments 6,000; Accent Group 6,000; Michael Hill 1300; and Virgin Australia 10,000 workers among others.

these payments as a first response directed at welfare recipients whose circumstances were largely unchanged - they were not at this time facing any additional cost of living pressures than they were prior to the lockdown – are something to be reflected on, especially at a time when economic activity was trying to be suppressed. At the same time, small business grants of $25,000 and a 50 per cent wage subsidy for apprentices and trainees were announced (Morrison and Frydenberg 2020).

Ten days later on the 22 March more economic support was announced by the Federal government, including early access to superannuation, up to an amount of $10,000, and a doubling of unemployment benefits (JobSeeker), from $550 to $1,100 per fortnight at an estimated cost of $66bn (Morrison and Frydenberg 2020b).

Just over a week later on March 30, the Australian Treasurer announced one of the largest single policy responses in Australia's history: JobKeeper (Morrison and Frydenberg 2020). At an estimated cost of $130bn, and an expectation that this would support almost half the workforce for the next six months, the JobKeeper program was a huge commitment by the Australian government to support businesses and workers. Within a two week window the government had committed to invest over $320 billion or 16.4 per cent of GDP to try and deal with the economic fallout of the COVID-19 crisis (Morrison and Frydenberg 2020).

As the crisis extended over the following months and it was clear that businesses and workers would need ongoing support, an announcement to extend JobKeeper was made on the 21st July for a further six months until March 20201 at an estimated cost of $16.6bn (Morrison *et al*. 2020).

The focus of this paper is on the efficacy of the Australian JobKeeper program design, including how well it meets its overall objective of retaining employer-employee matches; how well it is targeted relative to the needs of both businesses and workers; and the adequacy of JobKeeper as a wage replacement scheme. We consider both the original JobKeeper design, JobKeeper 2.0 and a series of alternative wage subsidy designs that we believe would more effectively target both employers and workers, incentivise a reallocation of labour and support a faster economic recovery. This includes the removal of the cliff that businesses and workers face when turnover loss reduces below 30 per cent, retaining the employer-employee match through minimising eligibility exclusions and targeting more effectively through providing a wage replacement commensurate with current wages.

2. The JobKeeper Subsidy – a short-time wage subsidy

The JobKeeper scheme is unlike most traditional wage subsidies, which generally seek to address a labour market failure where workers face significant barriers that prevent them from gaining employment. Wage subsidies of this nature can be categorised as a hiring subsidy, and are one of the most common forms of Active Labour Market Policy. These programs gained significant traction in the 1970s and 1980s as a policy response to slower growth and rising unemployment in many countries (Organisation for Economic Cooperation and Development (OECD) 1996).

Borland (2016) provides a review of wage subsidies from an Australian perspective and defines these as a direct or indirect monetary transfer to an employer

which is linked with the hiring of a new worker. The Department of Education Skills and Employment (2020) provide a similar definition, but focus primarily on direct monetary transfers. An alternative characterisation is to divide demand-side employment policies into 'hiring subsidies' and 'wage subsidies'. The European Commission (2012); (2014) argue that wage subsidies refer to direct payments to employers to either retain or hire more workers, and that hiring subsidies encompass both direct and indirect payments with a focus on reactivating the long-term unemployed. Brown and Koetti (2015) also separate such programs into wage subsidies and hiring subsidies, referring to wage subsidies as payments designed to maintain existing employment, and hiring subsidies as payments designed to hire job seekers.

The JobKeeper scheme does not fit squarely into either of these standard definitions, having the overall aim of retaining people in employment who are not necessarily suffering from any type of human capital deficiency or standard employment barrier. Instead, JobKeeper serves the purpose of providing temporary financial support to ameliorate what is expected to be a temporary shock to the labour market and reduction in labour demand. These types of 'short-time work' or 'temporary wage subsidy' were used during the Global Financial Crisis and have multiple objectives including retaining employer-employee matches, preventing mass job losses and supporting economic recovery (International Labor Organization (ILO) 2020).

At the time of writing, more than fifty countries had implemented some form of short-time wage subsidy scheme in response to the COVID-19 pandemic. These countries span Europe, the Asia-Pacific and North and South America. For Australia, the JobKeeper package was the first time a short-time wage subsidy like those used during the global financial crisis in other countries had been introduced. This meant that the original JobKeeper subsidy was designed and implemented rapidly - announced only 10 days after travel bans on non-residents were introduced.

The Australian JobKeeper legislation passed on April 9th, 2020 under the Coronavirus Economic Response Package (Payments and Benefits) Act 2020 (Cth) and was subsequently updated to its current version on May 1st, 2020. Under the original JobKeeper scheme, eligible employers receive $1,500 per fortnight for each eligible employee for the 6 months between 30 March 2020 and 27 September 2020. The first JobKeeper payments were delivered in the first week of May with payments backdated to the 30th March (Australian Taxation Office (ATO)) 2020 #80). Like almost all country wage subsidy schemes implemented at the time, JobKeeper was designed as a direct grant paid to the employer with various eligibility and regulatory criteria placed around the design.[3]

Employer eligibility

Eligibility is primarily based around turnover loss, where businesses with an aggregate turnover of less than $1 billion are deemed to be eligible for JobKeeper payments if they have, or expect to have, a fall of at least 30 per cent in GST turnover. For

3 A number of other subsidies pay the subsidy directly to the employee, including Thailand, Argentina, Chile and Uruguay (See (International Labor Organization (ILO), 2020 #41)).

businesses with an aggregate turnover of more than $1 billion, the threshold loss in turnover is at least 50 per cent (Australian Department of the Treasury 2020a).

A number of other eligibility exclusions and exceptions were applied. Large banks subject to the Major Bank Levy, along with government departments are ineligible for the subsidy. Charities and not-for-profits on the other hand only required an estimated fall of 15 per cent in GST turnover to be eligible for the subsidy, however universities and non-government schools despite their not-for-profit status were excluded from this lower threshold.

Employer eligibility criteria is similarly applied across most temporary wage subsidies that were launched around the world at the same time. In most countries (including Australia), all enterprises are eligible for their respective subsidy as long as they are registered within the country, but government agencies are often excluded or limited. Enterprises are generally required to show that they are facing economic difficulties as a result of COVID-19 at a particular point in time.[4]

Most countries that have implemented a temporary wage subsidy also determine if a business is facing economic difficulties by setting a level of revenue decline that must be met. This level is typically set between 20 and 50 per cent, often varying depending on the business size (ILO 2020). Another common method is to base enterprise eligibility on decreases in working hours or in the number of people employed, as is the case in Germany (German Federal Ministry of Labour and Social Affairs 2020) and France (Service Public France 2020).

Employee eligibility

Employee eligibility for JobKeeper requires employees to be employed by their employer as of the 1 March 2020, and to have been with this employer for at least 12 months prior. Employees are also required to be an Australian or New Zealand citizen, permanent resident, or hold a special category visa[5] at March 1, 2020 (Whiteford 2020b). Employees who hold multiple jobs are only able to receive one JobKeeper payment, and employees who are currently receiving Parental Leave Pay are also not entitled to receive the JobKeeper payment (Australian Department of the Treasury 2020).

Many other countries also exclude short-term casuals, with employees generally having to be employed for a specific amount of time, or at a specific point in time to be deemed eligible. In Sweden for example, those employed for less than three months are ineligible. It is also common for countries to exclude unregistered workers, non-citizens or non-permanent residents from short-time work subsidies. For example in New Zealand and Singapore, only permanent residents, citizens, or those on specific visas are eligible for the subsidies (Morrison and Frydenberg 2020; New

4 Employers are required to estimate their actual or expected decrease in turnover relative to a comparable period, generally compared to the same period (either month or quarter) a year ago. If they meet eligibility requirements JobKeeper is paid in respect of the period that turnover is expected to fall. The Australian Taxation Office offers a Basic and Alternative test to satisfy decrease in turnover, with modifications for labour hire firms and Universities.

5 Special Category Subclass 444 visas apply exclusively to citizens of New Zealand. The visa is issued on arrival to Australia, and only requires a New Zealand citizen to present a valid New Zealand passport (Services Australia, 2020).

Zealand Ministry of Social Development 2020). Although the majority of subsidies are paid to keep employees in work, some countries only pay the subsidy if workers are temporarily stood down or laid off, such as in the UK and Korea.

Employee retention conditions

The majority of temporary wage subsidy schemes also have employee retention conditions, which fall into two main categories. First are schemes which only require employers to keep employees on the payroll over the period of the subsidy, such as in New Zealand, Australia, Germany, Ireland and the USA. Second are schemes that require employers to keep employees on the payroll for a period longer than the subsidy. For example, in France and Brazil, employees must retain their job for twice the period of the scheme. Some countries have also introduced temporary prohibition of dismissals. For example, in Argentina, employees cannot be dismissed or laid off for a 60-day period from 31 March 2020. Italy and Spain have also introduced similar measures. Within Australia an employer can dismiss an employee receiving JobKeeper, by applying the standard rules of ending employment (FairWork Ombudsman 2020).

Most schemes also have conditions regarding the minimum amount an employer must pay an employee, normally set at a percentage of an employee's normal wage. For example, in the USA salaries cannot fall by more than 25 per cent for an employee who had a wage lower than $100,000 in 2019. In Sweden, employees must receive between 88-96 per cent of their normal wages. In France employees must be paid at least 70 per cent of their normal gross salary. Many other countries have implemented similar measures, generally requiring employers to pay between 50 and 96 per cent of an employee's normal wage. In addition to this, there is often a minimum payment floor, which is generally set at or around the minimum wage. In Australia, employees are required to receive at least the subsidy as payment, however, employers are not required to pay anything beyond that.

Across most countries, subsidy amounts are typically set to a proportion of a worker's regular wage, with most countries choosing a level between 60-80 per cent. In the UK, up to 80 per cent of a furloughed employees monthly wage can be subsidised. In Germany, subsidies range from 60 to 87 per cent depending on whether employees have children and how many months the scheme has been operating. In France, employers will receive a subsidy equal to 70 per cent of an eligible employee's wage. Similarly, eligible employees in Belgium will receive 70 per cent of their average earnings up to a cap. In Sweden, employers can effectively receive a subsidy ranging from 88 to 96 per cent depending on their circumstances.

Very few countries have opted to pay the wage subsidy as a flat rate rather than as a proportion of a worker's wage. Australia is one exception, with an initial JobKeeper rate set to $1,500 per fortnight. New Zealand also sets a flat rate but differentiates payments for full and part-time workers – those working under 20 hours per week and those working 20 hours per week or more.

Duration and Administration

The JobKeeper scheme was initially expected to subsidise the salary of more than 6 million workers for a six month period, dating from the 30 March 2020 to the 27

September 2020 (Australian Department of the Treasury 2020a). The value of this package represents almost half of the entire wage bill ($286bn) of Australian workers over a six month period, and almost 7 per cent of annual GDP (Cassells and Duncan 2020a).

The duration of the subsidy varies between countries but generally ranges between 3-12 months, with many countries putting in place an extension. However, some countries such as Greece provide wage subsidies as a one-off payment.

The schemes are usually funded through general taxation and government spending, but administration of the schemes vary widely. The central revenue collection agency is a common administrator of these schemes, as seen in Australia, Canada, Ireland and the UK. Other common administrators include Federal employment agencies as is the case in Germany, and social security agencies.

JobKeeper 2.0

Following a review of the JobKeeper wage subsidy in June, the Australian government announced a JobKeeper extension to March 2021, in a modified form that introduces a two-tiered weekly payment of $600 per week for eligible workers employed for 20 hours per week or more, and $375 for employees working less than 20 hours per week, up to December 2020. These two subsidy rates will further reduce to $500 and $325 respectively from 1 January 2021. JobKeeper eligibility for businesses for both periods will require businesses to meet the turnover test relative to a comparable period, which is typically defined as the corresponding quarter in 2019. We note that by the time the JobKeeper extension is set to end, which is March 2021, a comparable period of revenue decline will extend past a twelve month period. Comparing revenue in the June quarter 2021 with the June 2020 quarter would not be practical.

However, the turnover loss criteria for JobKeeper 2.0 eligibility remain the same as for the original JobKeeper scheme, with most businesses having to show a real or expected turnover loss of 30 per cent or more compared to the same month or quarter in the previous year.

3. A critique of the JobKeeper design

Designing large-scale policies in a rapid time frame will inevitably lead to a number of design flaws. JobKeeper is no exception. In this section we highlight what we see as the most significant flaws of JobKeeper with respect to principles of adequacy, equity, efficiency and simplicity. We note that some of these features have been addressed to an extent with JobKeeper 2.0; but a number remain and require attention for future iterations and refinements. We begin by examining the current level of JobKeeper support across industries relative to their impact and how well this has been targeted.

Targeting Relative to Need

As of the 10 June 2020, more than 3.3 million workers across 896,000 businesses were in receipt of JobKeeper – just over half the original estimated coverage (Senate Select Committee on COVID-19 2020). The majority of these workers were employed in the Professional, Scientific and Technical Services sector, followed by the two largest

sectors – Health Care and Social Assistance sector and Construction. Together, these sectors comprise almost one-third of JobKeeper recipients with between 22 and 36 per cent of their respective workforces receiving a wage subsidy.

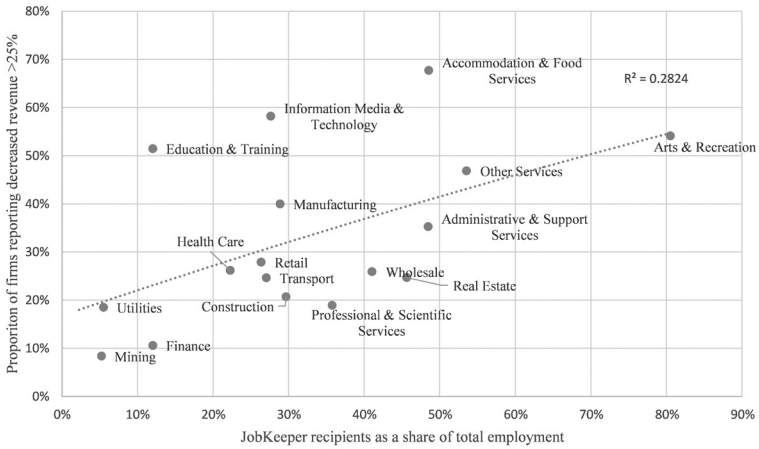
The effectiveness of JobKeeper in targeting sectors and supporting businesses and workers that have been most impacted by COVID-19 can be assessed to a degree through examining targeting relative to need. Treasury have stated in their recent review that JobKeeper has been well targeted with businesses in receipt of JobKeeper experiencing an average decline in turnover of 37 per cent compared to other businesses (Australian Department of the Treasury 2020c). However averages can mask underlying industry distributions and Treasury estimates do not include businesses and sectors that are automatically excluded from JobKeeper eligibility, yet facing substantial revenue loss such as the Higher Education sector.

We assess targeting relative to need by comparing JobKeeper receipt to businesses which reported decrease in revenue sourced from the ABS Business Indicators survey, noting that these data also have limitations (Figure 1). If JobKeeper is well targeted, we could expect industries with the largest proportion of business experiencing a fall in revenue to also have the largest share of workers in receipt of JobKeeper. To some extent this is the case. The Arts and Recreation sector has a high level of worker coverage relative to decreases in business revenue.

At the other end of the distribution, businesses operating in Mining and the Finance and Insurance sector report very low levels of revenue loss and similarly low levels of JobKeeper uptake. However, there are a number of noticeable outliers. More than 50 per cent of businesses in the Education and Training sector have recorded substantial revenue loss – half greater than 25 per cent compared to a year ago – yet only 12 per cent of workers in the sector are covered. Information Media and Technology and Accommodation and Food services also have a high proportion of businesses with revenue losses of more than 25 per cent, but relatively low coverage of workers in receipt of JobKeeper. Lower employee coverage in the Accommodation and Food services sector is likely to be related to the larger share of ineligible workers (short-term casuals).

We note the limitation of this analysis and that average business size within each sector will play a substantial role. Notwithstanding this limitation, the analysis offers some type of evidence of JobKeeper being reasonably well targeted, but that there are significant coverage gaps that are concentrated in particular sectors and sub-sectors. The childcare sector is one such example, where disruption and revenue losses are likely substantial, yet JobKeeper was withdrawn earlier.

Figure 1: JobKeeper recipients and business reports of revenue declines by industry



Note: Businesses operating in the Agriculture and Public Administration sectors are not included in the ABS Business Impacts survey.
Source: Bankwest Curtin Economics Centre | Authors' calculations from ABS Business Impacts survey and Senate Select Committee on COVID-19.

Preserving the employer-employee match

One of the key objectives of the JobKeeper program is to preserve the employer-employee relationship, enabling businesses to reopen quickly and reducing hiring and training costs that may accrue to both agents. Specifically, the Australian Government announced that JobKeeper will: '*support employers to maintain their connection to their employees. These connections will enable business to reactivate their operations quickly — without having to rehire*.' (Australian Department of the Treasury 2020b). However, by its own design JobKeeper distorts and breaks pre-existing employer-employee matches. It does this in two ways. First, by explicitly excluding employee and employer groups from eligibility, including multiple job holders, short-term casuals and temporary visa workers. Second, through its original flat rate design, which induces responses to change pre-existing arrangements, including increasing weekly hours of work to match higher wages.

Exclusion of employer and employee groups

The exclusion of certain employer and employee groups challenges the overall efficacy of the JobKeeper design and its primary objective of retaining existing employer-employee matches. Short-term casual workers – workers who have been employed for less than twelve months with their current employer – are excluded from JobKeeper eligibility.

These workers number around 1 million and make up 40 per cent of Australia's total casual workforce, signifying the importance of this group of workers in supplying flexible labour to the Australian labour market. Short-term casuals are concentrated in the hospitality, retail, health care and construction sectors, which together account for almost half of all short-term casual workers (Cassells and Duncan 2020b). These sectors have also been among the most adversely impacted by the pandemic and associated regulatory responses, particularly retail and hospitality (Figure 1).

Arguments for excluding short-term casuals include the greater likelihood of unemployment benefits (JobSeeker) providing adequate income replacement for lost earnings at $550 per week. However, similar proportions of short and long-term casual workers earn under this amount and 45 per cent of short-term casuals are earning above $550 per week (Cassells and Duncan 2020b). A further argument for exclusion is to preference workers with longer attachment to their employer and greater firm-specific knowledge that has been accumulated over a longer period. However, the nature of short-term casual workers being more likely to concentrate in heavily impacted sectors means that both workers and employers are penalised in their ability to access a wage subsidy that was ostensibly intended for them.

The majority of temporary visa holders are also excluded, with a similar effect. This group of workers number almost 1.1 million people[6] and are also concentrated in sectors that have been heavily impacted. While most countries also exclude non-citizens from their respective short-time wage subsidy programs, the exclusion of this group from JobKeeper eligibility again limits the number of employer-employee matches that can be retained.

Limiting JobKeeper eligibility to a single job also compromises employer-employee matches. There were more than 2.1 million workers in Australia who held more than a single job in 2016-17, and of these 410,00 held three jobs (Australian Bureau of Statistics 2019). Like short-term causal workers and temporary visa holders, multiple job holders are concentrated within and across industries that have been severely impacted. Many of these workers have had to choose which job to keep their attachment to in order to receive JobKeeper, again restricting the employer-employee match. This restriction also penalises employers who are more likely to employ multiple job holders. As a result, the number of multiple job holders has decreased by 39 per cent between the 14th March and 30th May 2020 (Australian Bureau of Statistics 2020b).

Ultimately the exclusion or limiting of these three groups, which together number some 4.2 million workers, and who are concentrated in some of the most affected sectors, works against the over-arching objective of retaining employer-employee matches. It is also likely that the exclusion of these groups and their concentration in businesses and sectors that have faced the most disruption is part of the reason why original JobKeeper estimates have never been realised.

6 https://www.sbs.com.au/news/australia-s-temporary-visa-holders-remain-locked-out-of-jobkeeper-and-jobseeker

Flat rate structure – simple on the surface, complex in responses it invokes

The flat rate structure was one of the unique aspects of the original JobKeeper wage subsidy design. Of the more than fifty countries that have introduced emergency wage subsidies over the course of the pandemic, none paid a single rate to all eligible workers regardless of their normal wage or employment status. New Zealand's was the closest to the Australian design, but differentiates payment by part-time and full-time work status.

There are a number of reasons why a flat rate structure would be introduced, including simplicity; minimising the administrative burden of the payment and the ease at which the subsidy can be policed; and the constraints imposed by the $550 per week Coronavirus Supplement to the JobSeeker unemployment payment.

On the surface, the JobKeeper program gives the impression of a simple design. Most firms had to show a (real or expected) decrease in turnover of 30 per cent or more, and in return received a flat rate of $750 per eligible worker. However, the original flat rate introduces a level of complexity – and inequity - for both employer and employees that could have been avoided. This complexity is passed from the administrator to employers and employees, through introducing a wage floor that in many instances is set at a level significantly higher than current wages received. This also creates a level of inequity between full and part-time employees, where a part-time worker on 15 hours per week effectively has access to the same weekly wage as their colleague who may still working a 35 hour week. This design feature also represents an inefficient allocation of resources – higher wage earners generally receive less and lower wage earners more. It also means that employers are left with having to address employee inequality and employees with potentially less bargaining power than before.

JobKeeper 2.0 and the new two-tier part and full-time rate addresses these issues to a degree, creating greater equity between full and part-time workers and more effective targeting. However, as the part and full-time rates will be based upon an employee's part and full-time status dating back to February 2020, this means that any new employer-employee working arrangements will now need to be undone, which again introduces another level of complexity and inequity. This also heavily disadvantages former multiple job holders that have had to reduce the number of jobs they hold in order to access JobKeeper. As of October 2020 they will now be required to move to a part-time JobKeeper payment level of $375 per week – reducing to $325 in January 2021 – without additional wages from their second or third job that would have formed a significant component of their weekly income prior to the pandemic. This is a significant flaw of the new JobKeeper 2.0 design and is at odds with the statements by Treasury that use multiple job holders losing their job as the justification of the original $750 flat rate.

Constraining Economic Recovery

The effectiveness of short-time wage subsidies in achieving their principal objectives has been examined in a number of studies. Most of these studies have focused on the use of short-time work subsidies during the global financial crisis. For example, Hijzen

and Venn (2011) using a difference-in-difference approach assess the impact of short-time work across 16 OECD countries during the financial crisis and find that overall short-time work schemes played an important role in preserving employment during the downturn, particularly in Japan and Germany.[7] However, the authors also note that the workers that were most likely to benefit were those on permanent contracts and that these benefits were likely to be limited to the crisis period and that short-time work schemes run the risk of supporting jobs that would have otherwise been maintained. The authors also caution against short-time work becoming a barrier to economic recovery by hindering labour reallocation, stating that *"…the main concerns about STW schemes relate to their potentially adverse impacts on the vigour of employment growth during the recovery and economic restructuring in the longer run*." (Hijzen and Venn p.36). In a follow-up study Hijzen and Martin (2012) provide evidence for this hypothesis, finding a negative impact of short-time work on recovery efforts, speculating that it impedes the efficient reallocation of jobs. Boeri and Bruecker (2011) also find evidence of a negative effect of short-time work on employment during recovery resulting in an increase in job losses and state that short-time work '*can only be effective in the presence of severe recessions*'(p.39). Cahuc and Carcillo (2011) also put forward this argument and recommend design features that reduce adverse impacts including a commitment to 'stable' short-time work rules to be applied.

The obstruction of efficient reallocation of labour is a pertinent issue for economic and labour market recovery. As argued by Boeri and Bruecker (2011), a short-time work wage subsidy effectively operates as a labour hoarding device and will ultimately reduce productivity. Within the Australian context, this was raised early on by Ma *et al*. (2020), who argued that the introduction of a wage subsidy represents a risk to economic recovery through 'locking in old lower-value economic arrangements' and hampering new higher value arrangements and industry and job creation. This has also been acknowledged in the recent Treasury review of JobKeeper (Australian Department of the Treasury 2020c).

The potential for JobKeeper to constrain economic recovery and productivity is a reality that needs to be considered. To contend with this, Boeri and Bruecker (2011) note the importance of short-time wage models being able to adapt to changes in economic conditions. The reduction of JobKeeper 2.0 payment rates in October 2020 and again in January 2021 pre-empts such changes in economic conditions. However, there is a strong possibility that recovery may be much further away. Incorporating a design characteristic that responds to economic conditions as they arise is a more organic way to support businesses through recovery and will help minimise employer incentives to restrict economic activity and recovery. We offer some of these options in the next section.

7 Hijzen A and Venn D. (2011) The Role of Short-Time Work Schemes during the 2008-09 recession. *OECD Social, Employment and Migration Working Paper No.115*. Paris: OECD Publishing, 1-45. estimate the average jobs impact at a national level to be 234,821 for Germany and 416,095 for Japan, but note that these estimates are an upper limit.

A better JobKeeper design

Lessons can be drawn in Australia from temporary wage subsidy designs that have been introduced in other countries. Indeed, this is already the case, with the JobKeeper 2.0 design matching elements of the two-tier wage subsidy introduced in New Zealand in March 2020.

As noted in the Australian Treasury JobKeeper review, *"...it may be possible to introduce a two-tiered payment system, as in NZ, based on working hours where part-time employees receive a lower payment, with part-time defined by an hours threshold – in NZ this is below 20 hours per week*." (Australian Department of the Treasury, 2020c).

Nevertheless, JobKeeper 2.0 still suffers from a number of design limitations and weaknesses relative to other potential measures.

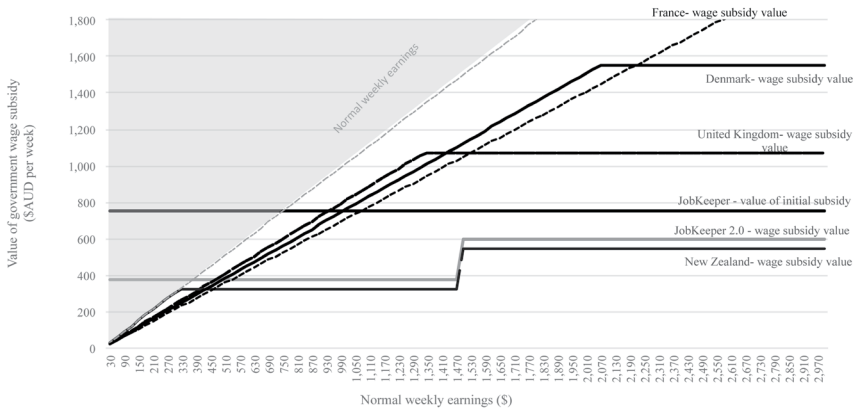
The first relates to the efficiency with which the payment is targeted. The flat-rate payments in JobKeeper create an arguably undesirable situation in which lower-paid, principally part-time workers receive more in subsidy than they were previously paid in their normal work (Cassells and Duncan 2020a).[8]

The second is that the single 30 per cent turnover loss threshold remains as the key eligibility criterion, retaining the same disadvantages as the original JobKeeper scheme.

An alternative JobKeeper design could take the form of a proportionate wage subsidy of up to 100 per cent of the normal wage, with the government's contribution capped at a maximum payment rate rather than as a flat-rate. Such a capped wage subsidy model is more tailored, and provides a more targeted and efficient wage replacement system. And employers can still choose to pay the gap between the government subsidy and an employer's normal wage.

8 The New Zealand wage subsidy protects against overpayment, stipulating that "*employers must pass the full value of the relevant subsidy received onto the employee, except where a person's wages or salary are normally less than the relevant subsidy rate. In [this] case, employers must pay them at least their normal wages. Employers can use any excess subsidy to help pay the wages of other affected employees*." See https://www.employment.govt.nz/leave-and-holidays/other-types-of-leave/coronavirus-workplace/wage-subsidy

Figure 2: Temporary wage subsidies: selected international designs



Notes: All wage subsidies are converted to AUD for comparison with Australia's JobKeeper and JobKeeper 2.0. The shaded triangle covers the area for which the wage subsidy value would exceed normal weekly earnings.
Source: Bankwest Curtin Economics Centre | Authors' calculations from various sources.

4. A modelling framework

We create a modelling framework that provides a basis to simulate entitlements to alternative JobKeeper subsidy designs over the course of transition to economic recovery. Our approach captures variation in the incidence of alternative wage subsidy designs by sector, and takes account of the potential trajectory of recovery over an 18 month period from October 2020 to March 2022, as a means to simulate changes in wage subsidy costs and entitlements over time.

The empirical analysis in this paper takes advantage of a detailed simulation of the Australian workforce, using the BCEC model SELMA.[9] This environment captures full variations in wages, labour force status and workforce composition across detailed industry and occupation classifications, and provides a basis to model the costs and distributional impacts of alternative wage subsidy designs. Our experimental set up is as follows:

Turnover loss by industry sector

Industries are ranked according to the degree of impact that businesses within each industry group have experienced as a result of the COVID-19 pandemic. Specifically, we attach a series of empirical distributions of turnover losses T^e to ANZSIC three-digit industry groups that have either faced direct closure (DC) or have been indirectly significantly impacted (IC) by the COVID-19 contraction. The same approach is applied to industry groups that have suffered medium (ME), low (LE) or very low (VLE) effects as well as those considered essential services (ES).

9 The Simulation Environment for Labour Markets in Australia (SELMA).

The turnover loss distribution $f(T^e)$ for each industry group is modelled to be log-linear in form for impact levels e = DC, IC, ME, LE, VLE, ES so that $\ln(T^e) \sim N(\mu_e, \sigma_e^2)$. These distributions provide a basis to simulate the likelihood of business turnover falling by x per cent or more relative to the pre-COVID-19 period:

$$\Pr\,(T^e \geq x \mid e) = 1 - F_e(x) = 1 - \Phi\left(\frac{\ln(x) - \mu_e}{\sigma_e}\right) \tag{1}$$

One eligibility criterion to qualify for JobKeeper support requires most Australian businesses to demonstrate a projected loss in turnover of 30 per cent or more against the relevant comparison period in 2019 (either the same quarter or the same month in the previous year).[10]

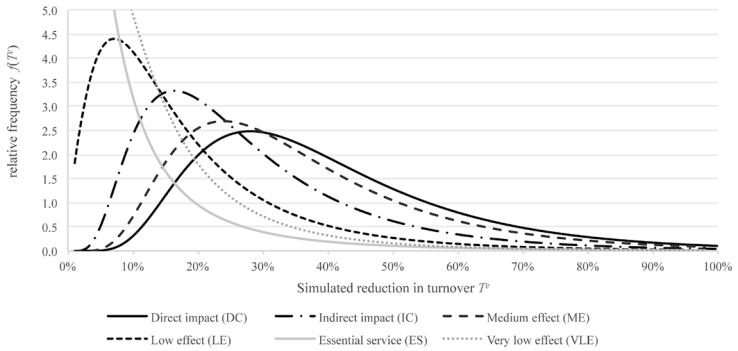
Given the assumed turnover loss distributions, the probability of JobKeeper qualification can therefore be projected as $\Pr\,(T^e \geq 0.3 \mid e) = 1 - F_e(0.3)$, which varies according to the estimated degree of impact of COVID-19 on each industry group.

The means and variances of each turnover loss distribution $f(T^e)$ are calibrated to replicate as closely as possible the job losses and observed JobKeeper caseloads by industry sector as at 10 June 2020 (Senate Select Committee on COVID-19 2020), as well as the self-reported impacts on revenues felt by businesses using data from ABS labour force and business surveys (Australian Bureau of Statistics 2020a).[11]

10 Exceptions to this rule include businesses with turnover in excess of $1bn, for which a demonstrated 50 per cent loss is required, and registered charities for which 15 per cent fall in turnover is required.

11 The parameters of each turnover loss distribution are calibrated to minimise the sum of squared differences between observed and simulated JobKeeper caseloads across industry sector, weighted by sector employment.

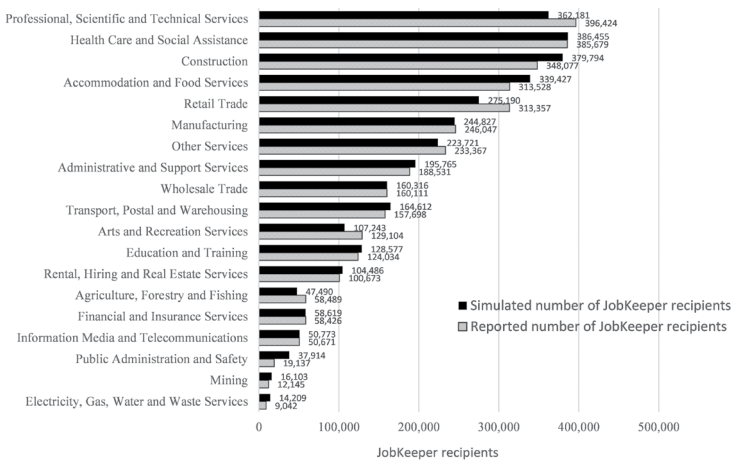
Figure 3: Simulated distributions of turnover loss from COVID-19



Notes: Simulated turnover loss distributions are calibrated to minimise the sum of squared differences between observed and simulated JobKeeper caseloads across industry sector, weighted by sector employment size.
Source: Bankwest Curtin Economics Centre | Authors' calculations using SELMA

Applying these turnover loss distributions to the 474 detailed groups in the ANZSIC three-digit industry classification leads to the simulated counts of JobKeeper recipients by broad industry sector shown in Figure 4. The fit is strong – a test of the similarity between simulated and observed JobKeeper counts using Pearson's chi-squared test yields a test statistic of 0.1927 (p-value = 0.0000).

Figure 4: Reported and simulated number of JobKeeper recipients, as at 10 June 2020



Source: Bankwest Curtin Economics Centre | Authors' calculations using SELMA

Importantly, the representation in equation (1) provides us with the capacity to simulate not just the distribution of turnover losses across industry sub-sectors and the likelihood of wage subsidy support under current and alternative eligibility criteria, but also the potential trajectories of economic recovery as the COVID-19 situation relaxes.

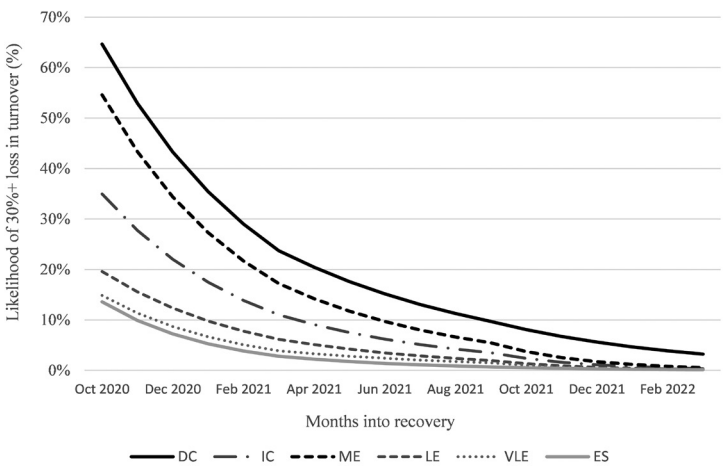
We assume a series of recovery pathways over at least 18 months for industries impacted to different degrees by the COVID-19 pandemic. These are reported in Table 1 and represented graphically in Figure 5.

Table 1: Projected COVID-19 recovery pathways

		Extent of recovery to pre-COVID level		
COVID-19 impact category	*Initial likelihood of 30% turnover loss*	*After 6 months*	*After 12 months*	*After 18 months*
Direct impact (DC)	64.7%	70%	85%	95%
Indirect impact (IC)	34.9%	75%	90%	99%
Medium effect (ME)	54.6%	75%	90%	99%
Low effect (LE)	19.6%	75%	90%	99%
Very low effect (VLE)	14.8%	80%	90%	99%
Essential service (ES)	10.0%	85%	95%	99%

Notes: Initial likelihoods of 30% + turnover loss probabilities based on calibrated log-normal turnover loss distributions shown in Figure 3.
Source: Bankwest Curtin Economics Centre | Authors' calculations using SELMA

Figure 5: Simulated trajectories for economic recovery post-COVID-19



Notes: Initial likelihoods of 30% + turnover loss probabilities based on calibrated log-normal turnover loss distributions shown in Figure 3. Trajectories parameterised using the economic recovery schedules in Table 1.
Source: Bankwest Curtin Economics Centre | Generated using BCEC's SELMA labour market environment.

Earnings distributions by occupation

Patterns of employment across Australian businesses over the course of economic recovery are assessed using information from detailed counts of ANZSCO four-digit occupations for each ANZSIC three-digit industry classification.[12]

The distributions of wages w_k for full-time and part-time workers in each occupation *k* is assumed to take a log-normal form $\ln(w_k) \sim N(\mu_k, \sigma_k^2)$, with means and standard deviations parameterised using information from the 2018 Employee Earnings and Hours (EEH) and the 2017-18 Survey of Income and Housing (SIH) surveys respectively.

The level of entitlement to wage subsidies for each industry sub-sector is then generated by applying specific subsidy rules to the simulated wage distributions for all occupations within that industry, weighted by their respective industry-specific employment counts.

For a split-rate wage subsidy that provides s_{PT} for workers whose usual weekly hours h_k in occupation type *k* fall below some threshold $\bar{h}$, and s_{FT} otherwise, the expected wage subsidy value is:

$$\begin{aligned} \mathrm{E}(s \mid w_k) &= \Pr(h_k \geq \bar{h}).\mathrm{E}(s \mid h_k \geq \bar{h}) + \Pr(h_k < \bar{h}).\mathrm{E}(s \mid h_k < \bar{h}) \\ &= \bar{p}_k.s_{FT} + (1 - \bar{p}_k).s_{PT} \end{aligned} \tag{2}$$

where $\bar{p}_k$ represents the (fixed) conditional probability[13] of full-time employment for workers in occupation type *k*.

As an alternative design, we consider a wage subsidy *s* that replaces a proportion α of workers' wages w_k up to a single payment threshold $\bar{w}$. The expected wage subsidy paid in respect of workers in occupation type *k* under the assumption of log-normality in the wage w_k can be derived as:

$$\begin{aligned} \mathrm{E}(s \mid w_k) &= \Pr(\alpha w_k \geq \bar{w}).\mathrm{E}(s \mid \alpha w_k \geq \bar{w}) + \Pr(\alpha w_k < \bar{w}).\mathrm{E}(s \mid \alpha w_k < \bar{w}) \\ &= \left[1 - \Phi\left(\frac{\ln\left(\frac{\bar{w}}{\alpha}\right) - \mu_k}{\sigma_k}\right)\right].\bar{w} + \Phi\left(\frac{\ln\left(\frac{\bar{w}}{\alpha}\right) - \mu_k}{\sigma_k}\right).\mathrm{E}(s \mid \alpha w_k < \bar{w}), \end{aligned} \tag{3}$$

$$\mathrm{E}(s \mid w_k < \bar{w}) = \alpha e^{\mu_k + \frac{\sigma_k^2}{2}}.\Phi\left(\frac{\ln\left(\frac{\bar{w}}{\alpha}\right) - \mu_k - \sigma_k^2}{\sigma_k}\right) / \Phi\left(\frac{\ln\left(\frac{\bar{w}}{\alpha}\right) - \mu_k}{\sigma_k}\right). \tag{4}$$

12 The distribution of occupation types for each industry group are drawn from the 2016 Australian Census of Population and Housing, scaled to current workforce size Australian Bureau of Statistics. (2017) Census of Population and Housing, 2016. *(ABS Cat.No. 2001.0). Accessed through ABS Tablebuilder.* Canberra: Australia.

13 For the empirical simulations of a split-rate wage subsidy, we treat the shares of part-time and full-time workers for each occupation type k as fixed. A more complex approach could potentially allow for some behavioural change in the propensities for part-time and full-time work from the introduction of wage subsidies – driven by either employers' or workers' preferences.

Projected wage subsidy costs and distributions

The expected cost $\mathrm{E}(S_i \mid e)$ to the government of providing wage subsidies s to businesses at each level of impact e for industry group i may be simulated by aggregating the expected value of wage subsidy $\mathrm{E}(s \mid w_{k_i})$ across all K occupational types, and weighting by the probability of eligibility $\Pr(T^e \geq x \mid e)$ due to turnover loss.

Given N_{k_i} workers of occupation type k in industry group i, and using (1) to (4), the expected cost for a wage subsidy design where eligibility is based on turnover loss exceeding a single threshold x can be derived as:

$$\mathrm{E}(S_i \mid e) = \Pr(T_i^e \geq x \mid e).\sum_{k_i=1}^{K} N_{k_i}\,\mathrm{E}(s \mid w_{k_i}), \tag{5}$$

while the total cost to the government across all industry groups becomes:

$$\mathrm{E}(\mathbf{S} \mid e) = \sum_i N_{k_i}\,.\,\mathrm{E}(S_i \mid e). \tag{6}$$

As noted earlier, the initial JobKeeper design introduced by the Australian government in April 2020 and the modified JobKeeper 2.0 design from October 2020 both include eligibility criteria for businesses based on a single turnover threshold. Although simple in design, each suffers from the problem that eligibility for the subsidy will entirely cease over the course of a business's recovery when turnover crosses that threshold.

This design feature creates a 'cliff' through the loss of potentially significant wage subsidy support that may well affect the continued recovery of a business. Indeed, the presence of this cliff could create an incentive for businesses to attenuate their recovery activities in order to maintain entitlement to the subsidy. The incentive to retain JobKeeper eligibility is also likely to be driven by continued market and trading uncertainty the longer the pandemic and associated regulatory responses continue. Businesses will develop speculative practices around future outbreaks and lockdowns that will encourage them to retain JobKeeper for as long as possible.

An alternative wage subsidy design that mitigates this problem incorporates a *graduated* series of support payments that vary according to the level of turnover loss.

Such a design provides for J distinct wage subsidy payments s_j for $j = 1, \ldots, J$, available to eligible workers in businesses with percentage turnover losses between x_{j-1} and x_j, for $x_{j-1} < x_j$ and $x_J = 1$.

The probability of being eligible for subsidy payment s_j then becomes:

$$\begin{aligned}\Pr(s = s_j \mid e) &= \Pr(x_{j-1} \leq T^e < x_j \mid e) \\ &= \Phi\left(\frac{\ln(x_j) - \mu_e}{\sigma_e}\right) - \Phi\left(\frac{\ln(x_{j-1}) - \mu_e}{\sigma_e}\right)\end{aligned} \tag{7}$$

with a corresponding wage subsidy cost for industry group *i* given by:

$$\mathrm{E}(S_i \mid e) = \sum_{k_i=1}^{K} N_{k_i} \cdot \left(\sum_{j=1}^{J} \Pr(x_{j-1} \leq T_i^e < x_j \mid e)\, s_j \right). \tag{8}$$

Empirical projections of cost measures (5), (6) and (8) are generated using BCEC's SELMA simulation environment for a series of wage subsidy designs.

5. Results: an evaluation of alternative wage subsidy designs

In this paper, we compare a number of alternative wage subsidy designs. These include the continuation of the initial $750 flat rate JobKeeper and the recently announced JobKeeper 2.0 replacement, but also extend to a number of capped percentage wage subsidies. We also compare designs that incorporate eligibilities using a single turnover loss threshold with graduated rates depending on the level of turnover loss. Further details of these alternatives are provided in Table 2.

Table 2: Alternative wage subsidies: simulation design details

Single revenue loss threshold			*Graduated revenue loss thresholds*	
Continuation of initial $750 JobKeeper design	*JobKeeper 2.0 ($600/$500 full-time, $375/$325 part-time)*	*Percentage wage subsidy (capped at $600/$375)*	*Graduated rate $600 subsidy (part-time at $375)*	*Percentage wage subsidy (capped at graduated rates)*
For 30%+ loss in turnover • $750 flat rate	*For 30%+ loss in turnover* • $600 for full-time • $375 for part-time	*For 30%+ loss in turnover* • 100%/80% normal wage • $600 cap (full-time) • $375 cap (part-time)	*For 30%+ loss in turnover* • $600 for full-time • $375 for part-time	*For 30%+ loss in turnover* • 100%/80% normal wage • $600 cap (full-time) • $375 cap (part-time)
	• $500 for full-time • $325 for part-time *(from January 2021)*		*For 25-30% loss in turnover* • $400 cap (full-time) • $250 cap (part-time)	*For 25-30% loss in turnover* • 100%/80% normal wage • $400 cap (full-time) • $250 cap (part-time)
			For 20-25% loss in turnover • $200 cap (full-time) • $125 cap (part-time)	*For 20-25% loss in turnover* • 100%/80% normal wage • $200 cap (full-time) • $125 cap (part-time)

Notes: Each wage subsidy variant may be simulated in BCEC's SELMA labour market model using relationships (1) through (8).

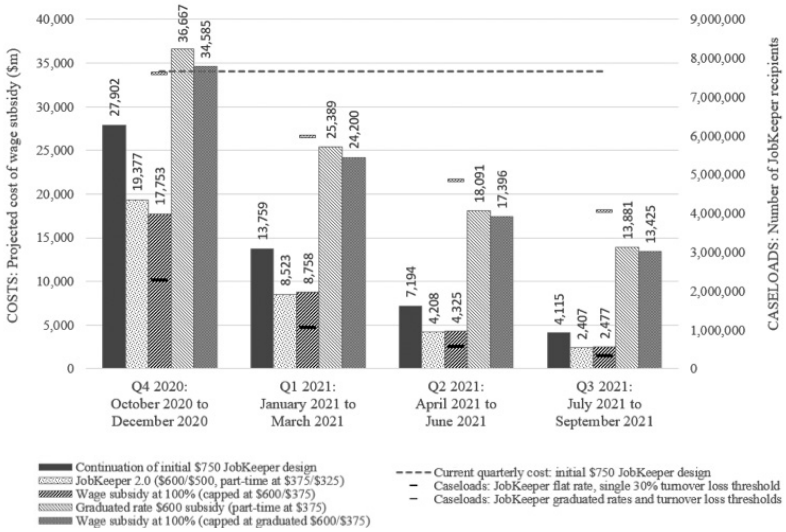
Our empirical evaluations compare wage subsidy designs according to (i) overall costs; (ii) the efficiency in targeting wage costs; (iii) the distribution of costs across industry sector; and (iv) the impact on a number of business case studies.

Costings of alternative wage subsidy designs

The current JobKeeper scheme has cost around $34bn during the first three months of its implementation to June 2020. We show this cost as a dashed line in Figure 6, to serve as a benchmark against which to compare the quarterly costs of other wage subsidy designs.

Figure 6 compares the projected costs of a series of wage subsidy designs over four quarters from October 2020 to September 2021. Projections are based on the costings methods shown in (6) and (7), and take account of the economic recovery trajectories described in Figure 5.

Figure 6 Projected costs of alternative wage subsidy designs



Notes: Costings and caseloads projections are underpinned by an economic recovery trajectory as outlined in Figure 5.
Source: Bankwest Curtin Economics Centre | Authors' estimates using BCEC's SELMA labour market model.

Single turnover loss thresholds

A continuation of the $750pw flat JobKeeper rate would cost $27.9bn over the three months to December 2020 (Q4 2020) and $13.8bn during the quarter to March 2021 (Q1 2021). This represents a combined six-month cost of $41.7bn to end March 2021 (Figure 6). Under this scenario, we project the number of wage subsidy recipients to reach 2,270,000 by December 2020, declining to 1,060,000 at the end of the first quarter of 2021.

The Australian government recently announced that the original JobKeeper will be replaced by the new split-rate JobKeeper 2.0 subsidy from October 2020, at an

estimated cost of around $16.6 billion over six months to end March 2021.[14] We project that JobKeeper 2.0 will cost substantially more than the Australian government's estimate, around $19.4bn during Q4 2020 and $8.5bn during the quarter to March 2021 by which time the subsidy rate reduces to $500/$325. These combine to a six-month cost of $29.7bn, some 68 per cent higher than the government's projection. This is because we predict caseloads to be higher than government projections due to a slower economic recovery.

Graduated turnover loss thresholds

To overcome the entitlement 'cliff' that comes from a single turnover threshold, we also simulate the costs of wage subsidy designs that feature a graduated series of payments that vary according to the level of turnover loss. These include a *graduated* system under which wage subsidies of $600, $400 and $200 for full-time workers (and $375, $250 and $125 for part-time workers) are payable for eligible workers in businesses with turnover losses of 30 per cent+, 25-30 per cent and 20 to 25 per cent respectively.

Predictably, reducing the severity of the entitlement cliff through graduated subsidy payment rates will increase the costs of the wage subsidy scheme as more businesses become eligible. Our projections suggest that the graduated wage subsidy design would cost around $36.7bn in Q4 2020 and $25.4bn during Q1 2021 - a combined cost of $62.1bn over six months. Nevertheless, the added costs do sit within the original JobKeeper funding envelope.

Flat-rate versus proportionate wage subsidies

Most countries that have introduced a wage subsidy during COVID-19 have applied a proportionate capped model (International Labor Organization (ILO) 2020). This ensures that workers retain a level of salary commensurate with their productivity and also assists in maintaining employer-employee match.

The aggregate costs of a proportionate wage subsidy are remarkably similar to those of the revised JobKeeper 2.0 scheme. A capped 100 per cent wage subsidy for workers in companies with turnover losses of 30 per cent or more, with subsidy caps of $600 for eligible employees working 20 hours or more and $375 otherwise, would cost around $17.8bn during Q4 2020 and $8.8bn during Q1 2021. This combines to a six-month cost of $26.5bn.

The same is true of a proportionate wage subsidy with graduated thresholds according to lost turnover. A 100 per cent wage subsidy scheme with graduated payment caps for full-time and part-time workers depending on the extent of turnover loss (see Table 2 for details) would cost $34.6bn over the course of Q4 2020 and $24.2bn during Q1 2021.

14 These estimated costings were reported in a joint media release from the Australian Prime Minister and Treasurer on 21 July 2020. Morrison S, Frydenberg J and Ruston A. (2020) *Media Release: JobKeeper payment and income support extended*. Canberra: Australia. Released 21 July 2020.

Proportionate wage subsidies are more efficient at targeting support (and will never provide more than a recipient's normal wage) compared to a split-rate subsidy scheme that will nevertheless pay more to some than their normal wage – a feature we now turn to.

Targeting of wage subsidy support

Table 3 compares the shares of wage subsidy recipients who are projected to receive more or less than their normal pay. Projections are shown for JobKeeper, JobKeeper 2.0 and a graduated rate subsidy scheme based on degree of turnover loss. We also include projections of shortfall and excess payments for 100 per cent and 80 per cent proportionate wage subsidy schemes using both single and graduated turnover loss thresholds.

The results in Table 3 make clear the fact that flat-rate wage subsidy schemes can lead to excess payments for a significant share of recipients. More than three quarters (76 per cent) of JobKeeper recipients who work part-time and 25 per cent of full-time recipients will receive *more* in subsidy payments than they normally earn.

The JobKeeper 2.0 design will mitigate this problem to a degree, but it remains the case that around 32 per cent of recipients in part-time work and 10 per cent of those in full-time work are still projected to receive subsidy payments that exceed their normal pay within an individual job – equivalent to 406,000 recipients as at December 2020.[15]

By design, proportionate wage subsidy schemes cannot provide more in support than a worker's normal wage, and the cap dictates the degree to which support is provided at a rate equal to usual pay. Under a capped 100 per cent wage subsidy scheme with a single 30 per cent turnover loss threshold, payments would match salaries for around 27 per cent of all recipients.

The results in Table 3 demonstrate that moving from a flat-rate scheme to a capped proportionate wage subsidy scheme in which fixed payments are converted to caps provides a fairer and more efficient allocation of support, typically at a lower cost. However, we note that the lower payment rate also means that many workers will receive wages that are far lower than their typical wage. A higher capped rate would minimise this but cost more.

15 We note that workers may receive less earnings overall due to multiple job holders having to surrender other jobs that they were holding in order to receive JobKeeper.

Table 3: Number of recipients with shortfall/excess wage subsidy relative to salary: alternative subsidy designs, as at December 2020

	Projected recipients with shortfall or excess wage subsidy relative to salary (as at December 2020)													
	Single revenue loss threshold								*Graduated revenue loss thresholds*					
	Continuation of initial $750 JobKeeper design		*JobKeeper 2.0 ($600/$500, part-time at $375/$325)*		*Wage subsidy at 100% (capped at $600/$375)*		*Wage subsidy at 80% (capped at $600/$375)*		*Graduated rate $600 subsidy (part-time at $375)*		*Wage subsidy at 100% (capped at graduated $600/$375)*		*Wage subsidy at 100% (capped at graduated $600/$375)*	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Recipents with shortfall in subsidy relative to salaries:														
Full-time recipients	1,098,171	(75%)	1,241,304	(84%)	1,241,304	(84%)	1,472,533	(100%)	4,624,329	(94%)	4,624,329	(94%)	4,933,915	(100%)
Part-time recipients	195,010	(24%)	418,965	(53%)	418,965	(53%)	797,038	(100%)	1,937,605	(73%)	1,937,605	(73%)	2,663,226	(100%)
All recipients	1,293,181	(57%)	1,660,269	(73%)	1,660,269	(73%)	2,269,570	(100%)	6,561,934	(86%)	6,561,934	(86%)	7,597,141	(100%)
Recipents with excess subsidy relative to salaries:														
Full-time recipients	374,361	(25%)	153,046	(10%)	-	-	-	-	309,586	(6%)	-	-	-	-
Part-time recipients	602,028	(76%)	253,059	(32%)	-	-	-	-	725,621	(27%)	-	-	-	-
All recipients	976,389	(43%)	406,106	(18%)	-	-	-	-	1,035,207	(14%)	-	-	-	-

Source: Bankwest Curtin Economics Centre | Authors' estimates using BCEC's SELMA labour market model.

Distribution of support by industry sector

There has been some debate in Australia on whether wage subsidies should be restricted to certain industry sectors, with the supporting argument that this would serve to better target support to businesses that have been impacted most by the COVID-19 pandemic.

Whether a focus of wage subsidy support on specific industry sectors is merited depends in large part on the structure of the wage subsidy scheme itself. A well-designed subsidy should tailor the level of support to suit the economic situation of the business without the need for *ad hoc* targeting, and with the minimum possible distortion to behaviour.

Table 4 presents a breakdown of simulated costs and caseloads of the wage subsidy alternatives across industries, with measures (5) and (8) for each industry sector generated using BCEC's SELMA labour market simulation environment.

In terms of overall costs, JobKeeper 2.0 over the year to September 2021 is projected to be directed most towards industry groups in construction (12.2 per cent of total costs), healthcare and social assistance (10.7 per cent), professional, scientific and technical services (11.4 per cent) and accommodation and food services sectors (9.4 per cent). These shares remain relatively similar across wage subsidy variants and are driven in large part by relative workforce size across industry sectors.

When measured as a share of the industry workforce, those sectors with the greatest reliance on wage subsidy support include arts and recreation services (82,600 recipients, representing 47 per cent of the industry's workforce), rental, hiring and real estate services (78,900, 43 per cent) and administrative and support services (144,500, 40 per cent).

Table 4: Projected costs and caseloads of alternative wage subsidy designs by industry sector: year to September 2021

	Wage subsidy costs – single revenue loss threshold						*Wage subsidy costs – graduated revenue loss thresholds*				
	Annual subsidy cost, year to September 2021				*Projected number of recipients (as share of industry workforce)*		*Annual subsidy cost, year to September 2021*			*Projected number of recipients (as share of industry workforce)*	
Industry sector	*Continuation of initial $750 JobKeeper design*	*JobKeeper 2.0 ($600/$500, part-time at $375/$325)*	*Wage subsidy at 100% (capped at $600/$375)*	*Wage subsidy at 80% (capped at $600/$375)*	*Caseloads at December 2020: single threshold*	*Caseloads at September 2021: single threshold*	*Graduated rate $600 subsidy (part-time at $375)*	*Wage subsidy at 100% (capped at graduated $600/$375)*	*Wage subsidy at 80% (capped at graduated $600/$375)*	*Caseloads at December 2020: graduated threshold*	*Caseloads at September 2021: graduated threshold*
	$m	$m	$m	$m	# (%)	# (%)	$m	$m	$m	# (%)	# (%)
Construction	6,005	4,204	4,213	4,068	268,700 (30%)	34,300 (4%)	10,427	10,140	9,945	769,700 (85%)	386,500 (42%)
Health Care & Social Assistance	5,905	3,679	3,476	3,305	254,700 (19%)	39,800 (3%)	11,051	10,464	10,184	986,600 (73%)	513,100 (38%)
Professional, Scientific & Technical Services	5,697	3,940	3,981	3,873	257,400 (33%)	31,100 (4%)	9,373	9,150	9,006	691,800 (89%)	340,800 (44%)
Accommodation & Food Services	5,386	3,242	2,892	2,696	237,500 (32%)	31,100 (4%)	7,720	6,974	6,667	659,400 (89%)	328,700 (45%)
Retail Trade	4,129	2,585	2,368	2,228	177,100 (17%)	29,200 (3%)	8,040	7,466	7,212	734,500 (70%)	390,300 (37%)
Other Services	3,959	2,621	2,485	2,354	169,900 (43%)	23,600 (6%)	5,483	5,098	4,915	376,200 (94%)	205,300 (51%)
Manufacturing	3,819	2,625	2,563	2,453	168,800 (25%)	23,100 (3%)	7,015	6,738	6,579	542,400 (80%)	275,400 (40%)
Administrative & Support Services	3,200	2,037	1,925	1,827	144,500 (40%)	17,100 (5%)	4,478	4,182	4,041	342,100 (94%)	171,900 (47%)
Wholesale Trade	2,631	1,805	1,788	1,722	117,000 (38%)	14,600 (5%)	4,029	3,875	3,785	286,200 (93%)	144,700 (47%)
Transport, Postal & Warehousing	2,535	1,742	1,698	1,628	110,400 (22%)	16,200 (3%)	4,806	4,607	4,498	377,900 (76%)	196,600 (39%)
Arts and Recreation Services	1,938	1,215	1,141	1,082	82,600 (47%)	11,600 (7%)	2,448	2,259	2,177	172,000 (98%)	95,600 (54%)
Education & Training	1,835	1,180	1,147	145	68,700 (7%)	19,700 (2%)	5,508	5,325	5,231	526,700 (57%)	308,200 (33%)
Rental, Hiring & Real Estate Services	1,812	1,238	1,223	1,172	78,900 (43%)	10,500 (6%)	2,598	2,489	2,422	174,600 (96%)	92,900 (51%)
Financial & Insurance Services	836	581	587	571	32,100 (8%)	8,400 (2%)	2,585	2,542	2,513	227,300 (59%)	129,300 (34%)
Information Media & Telecommunications	778	530	531	515	33,600 (19%)	5,300 (3%)	1,579	1,541	1,518	127,600 (71%)	67,900 (38%)
Public Administration & Safety	728	496	505	489	23,900 (3%)	12,000 (2%)	3,266	3,214	3,180	285,600 (40%)	212,000 (30%)
Agriculture, Forestry & Fishing	680	464	453	432	27,000 (10%)	6,000 (2%)	1,899	1,839	1,802	169,000 (64%)	91,300 (34%)
Mining	256	183	189	184	9,100 (5%)	3,300 (2%)	1,001	991	983	84,500 (48%)	55,600 (31%)
Electricity, Gas, Water & Waste Services	209	147	149	145	7,700 (7%)	2,400 (2%)	722	712	704	62,900 (55%)	37,800 (33%)
All industries	52,338	34,516	33,313	30,890	2,269,600 (19%)	558,100 (4.6%)	94,029	89,606	87,362	7,597,100 (62%)	4,843,000 (40%)

Source: Bankwest Curtin Economics Centre | Authors' estimates using BCEC's SELMA labour market model.

6. Concluding remarks

The rapid design and roll out of Australia's first short-time wage subsidy in response to the impact of COVID-19 offers us a number of important lessons, including how best to achieve its stated goals. This is important information not only for future wage subsidies that are used in similar emergency circumstances, but also in the context of JobKeeper 2.0 and the likelihood of further iterations of the scheme.

One of the primary goals of JobKeeper was to retain the employer-employee match, enabling businesses to reopen rapidly without having to recruit and train employees. The exclusion of short-term casual workers, multiple job holders and temporary visa holders undermined the ability of the program to achieve this overarching objective. This is particularly relevant within the most affected industries where a critical mass of workers with these characteristics are employed. A better solution for any future emergency wage subsidy would be to keep as many workers in scope as possible, if indeed the objective is to retain the employer-employee match. This could include for example reducing eligibility criteria to three rather than twelve months.

The flat-rate design has also compromised retaining employer-employee matches, with many part-time workers over compensated and many full-time workers under compensated, resulting in employers and employees renegotiating hours of work and roles. The flat-rate design has also meant that resources have not been as efficiently and equitably targeted as they could be and was one of the key flaws in the original JobKeeper.

JobKeeper 2.0 addresses some of these issues by introducing two payment levels, which will deliver greater equity between full and part-time workers and more effective targeting. However, as the new part and full-time rates will be based retrospectively on an employee's part and full-time status as of February 2020, this means any new employer-employee matches will now need to be unravelled, introducing another level of complexity and inequity within the system. This also heavily disadvantages former multiple job holders that have had to forego previous jobs in order to access JobKeeper, but have become more reliant on a single JobKeeper payments as a result. The imminent reduction in payment rates for a former part-time multiple job holder is unlikely to fully compensate prior wages.

The potential for a wage subsidy like JobKeeper to constrain economic recovery and productivity is also a reality that needs to be taken into account as it can incentivise labour hoarding and restrict new job creation. A wage subsidy that is flexible responds to economic conditions as they arise will help minimise these issues.

Notwithstanding these issues, JobKeeper 2.0 is an improvement on the original JobKeeper design, especially from the perspective of targeting. However, it still falls short of an ideal given that it suffers from the same problem as the original JobKeeper in having a single turnover loss threshold and therefore a cliff beyond which eligibility would entirely disappear. A preferred model in our view is one that combines a proportionate wage subsidy with a graduated scale of entitlement depending on the degree of business turnover loss. In doing so this would improve targeting and also make a policy fit-for-purpose in navigating through a post-COVID-19 recovery. A proportionate wage subsidy with graduating entitlements at different levels remains within the existing funding envelope for JobKeeper.

References

Australian Bureau of Statistics. (2017), Census of Population and Housing, 2016. *(ABS Cat.No. 2001.0). Accessed through ABS Tablebuilder.* Canberra: Australia.

Australian Bureau of Statistics. (2019), Multiple Job Holders. *ABS Cat.No. 6160.0 Jobs in Australia, 2011-12 to 2016-17 (Table 4).* Canberra: Australia.

Australian Bureau of Statistics. (2020a), Business Indicators, Business Impacts of COVID-19 Survey, July 2002. *ABS Cat.No 5676.0.55.003.* Canberra: Australia.

Australian Bureau of Statistics. (2020b), Labour Force, Australia, April 2020. *ABS Cat.No 6202.0.* Canberra: Australia.

Australian Department of Health. (2020a), Coronavirus (COVID-19) adive for travellers. Canberra: Australia. August 2020.

Australian Department of Health. (2020b), Coronavirus (COVID-19) current situation and case numbers. Canberra: Australia. August 2020.

Australian Department of Home Affairs. (2020), COVID-19. Australia. February 2020.

Australian Department of the Treasury. (2020a), JobKeeper Payment — Information for employers. *Fact Sheet - Economic Response to the Coronavirus.* Canberra: Australian Government. May 2020.

Australian Department of the Treasury. (2020b), JobKeeper Payment — Supporting businesses to retain jobs. *Fact Sheet - Economic Response to the Coronavirus.* Canberra: Australian Government. April 2020.

Australian Department of the Treasury. (2020c), The JobKeeper payment: three-month review. Canberra: Australian Government. June 2020.

Australian Taxation Office (ATO). (2020), Amount of JobKeeper payment. Australian Government. June 2020.

Boeri T and Bruecker H. (2011), Short-Time Work Benefits Revisited: Some Lessons from the Great Recession. *IZA Discussion Paper No.5635.* 1-52.

Borland J. (2016), Wage Subsidy Programs: A Primer. *Australian Journal of Labour Economics* 19: 131-144.

Brown AJG and Koetti J. (2015), Active labor market programs – employment gain or fiscal drain? *IZA Journal of Labor Economics* 4:12: 1-36.

Cahuc P and Carcillo S. (2011), Is Short-Time Work a Good Method to Keep Unemployment Down? *IZA Discussion Paper Series, No. 5430.* 1-33.

Cassells R, Dockery AM, Duncan AS, *et al.* (2020), Potential Job Losses in the COVID-19 Pandemic. *Bankwest Curtin Economics Centre COVID-19 Research Brief #2.* 1-5.

Cassells R and Duncan AS. (2020a), JobKeeper and JobSeeker: How many workers will lose and how many will gain? *Bankwest Curtin Economics Centre COVID-19 Research Brief #3.* 1-6.

Cassells R and Duncan AS. (2020b), Short-term and long-term casual workers: how different are they? *Bankwest Curtin Economics Centre COVID-19 Research Brief #4.* 1-3.

Centers for Disease Control and Prevention. (2020), COVID-19 Pandemic Planning Scenarios. CDC Coronavirus Disease 2019 (COVID-19) Factsheet. June 2020.

Department of Education Skills and Employment. (2020), Wage Subsidies. *JobActive Fact Sheet*. Australian Government: February 2020.

European Commission. (2012), Long-term unemployment. *European Employment Observatory (EEO) Review*. Luxembourg: Publications Office of the European Union. September 2012.

European Commission. (2014), Stimulating job demand: the design of effective hiring subsidies in Europe. *European Employment Policy Observatory (EEPO) Review*. Luxembourg: Publications Office of the European Union. May 2014.

FairWork Ombudsman. (2020), Ending employment & the JobKeeper scheme. Australian Government. June 2020.

German Federal Ministry of Labour and Social Affairs. (2020), Questions and answers relating to short-time work *(Kurzarbeit)* and skills development.

Gruen D and Clark C. (2009), What have we learnt? The Great Depression in Australia from the perspective of today 19th Annual Colin Clark Memorial Lecture. Brisbane, Australia.

Hijzen A and Martin S. (2012), The Role of Short-Time Working Schemes during the Global Financial Crisis and Early Recovery: A Cross-Country Analysis. *OECD Social, Employment and Migration Working Papers No.144*. Paris: OECD Publishing, 1-38.

Hijzen A and Venn D. (2011), The Role of Short-Time Work Schemes during the 2008-09 recession. *OECD Social, Employment and Migration Working Paper No.115*. Paris: OECD Publishing, 1-45.

International Labor Organization (ILO). (2020), Temporary Wage Subsidies Fact Sheet. *ILO Fact Sheet: May 2020.*

Ma J, Pitchford R and Tourky R. (2020), Wage subsidies during COVID-19 are a bad idea. Canberra, Australia.: Australian National University.

Morrison S. (2020a), *Media Release: Australia is closing its borders to all non-citizens and non-residents*. Canberra: Australia. Released 19 March 2020.

Morrison S. (2020b), *Media Statement: Update on coronavirus measures*. Canberra: Australia. Released 24 March 2020.

Morrison S and Frydenberg J. (2020), *Joint Media Release: $130 billion Jobkeeper payment to keep Australians in a job*. Canberra: Australia. Released 30 March 2020.

Morrison S, Frydenberg J and Ruston A. (2020), *Media Release: JobKeeper payment and income support extended*. Canberra: Australia. Released 21 July 2020.

New Zealand Ministry of Social Development. (2020), Who can get the COVID-19 Wage Subsidy. New Zealand. 2020.

Organisation for Economic Cooperation and Development (OECD). (1996), The OECD Jobs Strategy: Pushing Ahead with the Strategy.

Sanche S, Lin YT, Xu C, *et al*. (2020), High Contagiousness and Rapid Spread of Severe Acute Respiratory Syndrome Coronavirus 2. *Emerging Infectious Diseases* 26: 1470-1477.

Senate Select Committee on COVID-19. (2020), Inquiry into the Australian Governments' response to the COVID-19 pandemic. Answers to Questions on Notice Treasury Portfolio.

Service Public France. (2020), Partial Activity: steps taken by the employer (partial or technical unemployment). France. July 2020.

Whiteford P. (2020a).

Whiteford P. (2020b), Open letter to the prime minister: extend coronavirus support to temporary workers.

World Health Organization. (2020), WHO Coronavirus Disease (COVID-19) Dashboard.: 2020.

Early estimates of the impact of COVID-19 disruptions on jobs, wages, and lifetime earnings of schoolchildren in Australia

Gigi Foster School of Economics, University of New South Wales

Abstract

What effects have the Australian COVID-19 disruptions had on our present and future labour force? In the first part of this paper, I document the effects of the disruptions on current jobs and wages in Australia from the March through May period of 2020 – by income level, gender, age, and industry – drawing on the monthly labour force survey and the ABS's new Weekly Payroll Jobs and Wages in Australia survey. I find that the lockdowns have disproportionately affected both jobs and wages in certain industries, and have been regressive in their substantially different impacts on workers of different ages, with mid-life workers by far the least affected and young workers disproportionately likely to have dropped out of the labour force. I also find that the government's JobKeeper program is likely to have had a major, if short-term, impact on job preservation and income levels. In the second part of the paper, I draw on state-level data on school closures over the same period to estimate the amount of pupil-days that have been disrupted due to the lockdowns, and then apply standard estimates from the economics of education literature of the correspondence between length of schooling and wages to estimate the wage losses expected to eventuate under different assumptions about how effective online learning is relative to school-based learning. Conservative estimates indicate losses of between AUD$50 million and AUD$100 million from coronavirus-related schooling disruptions.

JEL Codes: I2, I3, J2, J3
Keywords: Covid-19, foregone wages, unemployment, JobKeeper, school closures, online learning

Acknowledgements: This work benefitted from excellent research assistance provided by Michael Baker. All errors remain mine.

1. Introduction

What economic damage has been caused by the 2020 COVID-19 disruptions in Australia? Existing research using data from other countries and/or other times can be used to provide a rough gauge of some dimensions of the damage. However, due to the new, evolving, and unprecedented nature of the situation, few quantitative estimates yet exist of the extent and nature of the damage in Australia based on Australian data. The present paper takes a step towards filling this gap.

Globally, many impacts of the COVID-19 disruptions – from the virus itself, from people's individual endogenous responses to the perceived threat posed by the virus, and from governments' policy actions in response to the situation – have already occurred both within and outside the realm of labour markets, with labour market effects like job and income loss leading to further negative effects on broader measures of health and wellbeing. Suicides and domestic violence have reportedly increased in Australia and overseas (Cormack 2020, Taub and Bradley 2020, Bosman 2020, Ashworth 2020), healthcare for problems other than those relating to COVID-19 appears to have been crowded out, leading to excess morbidity and mortality (Scott 2020, Cohen 2020, Pan 2020), and particularly in the developing world, massive amounts of excess deaths have been witnessed due to famines, the stalling of health care programs, and civil unrest (Gurda 2020, Harvey 2020, Husain 2020). Most of these impacts are likely to have been regressive in nature, hurting most of those people who were already comparatively badly off. Further impacts are likely to be revealed over time as the world slowly catches back up with the economic trajectory we otherwise would have followed, were it not for the COVID-19-induced global economic slowdown. Based on the association between GDP per capita and human health/longevity (OECD 2017), the changes set in motion by the economic braking applied around the world starting in early 2020 would be expected to produce significant long-run damage. Back-of-envelope estimates indicate that such damage may easily be equivalent to the destruction of orders of magnitude more statistical lives than the destruction of human life attributable directly to COVID-19.[1]

The scale of these effects and their long-run nature likely explain why no formal academic papers yet exist that try to estimate them comprehensively. However,

1 The comparison appropriate for the evaluation of COVID-19 policy choices is between the loss of welfare arising from the policies pursued to the loss of welfare we would predict to have arisen were it not for those policies. While a formal accounting of these quantities is beyond the scope of the present paper, initial modelling of the potential loss of life from COVID-19 just within Australia (McCauley *et al*. 2020) delivered estimates of up to 150,000, or three orders of magnitude more than what Australia has actually experienced (just under 200), and one order of magnitude greater than what we would have experienced if we had seen the worst observed per-capita death rate in the world as of 1 July (Belgium, whose per-capita death rate would have translated to about 22,000 deaths in Australia; Statista 2020). Also, as most COVID-19 deaths and suffering occur in people aged 70 or more, the value of the quality-adjusted life years lost directly because of the virus is far lower than if the virus were age-blind. Based on the above counterfactual estimates of COVID-19-induced deaths, Australia's policy responses have arguably been far more expensive per QALY saved than what is spent by the government to save a QALY in normal times (https://clubtroppo.com.au/2020/05/18/the-corona-cost-benefit-analyses-of-richard-holden-bruce-preston-and-neil-bailey-ooops/).

short-run impacts specifically on standard labour market outcomes have already been estimated using data in other countries. In a recent series of two papers evaluating the evidence from the USA and Canada respectively, Béland and co-authors (2020a, 2020b) find evidence of significant regressivity of the economic impact of COVID-19-related disruptions in those two countries – with younger, minority, and less-educated workers and those who are unable to perform their work from home or without proximity to others feeling worse impacts than other types of workers. These authors also document significant mental health effects on affected workers. More effects on jobs and wages will eventuate as time goes by, but these papers at a minimum provide lower bounds of the damage based on a set of currently measurable outcomes in the USA and Canada.

Recent work has also attempted to estimate the longer-run effect of COVID-19 disruptions on children taken out of school. The Grattan Institute survey of this work (Sonnemann and Goss 2020) provides initial estimates of the increased achievement gap between more and less advantaged Australian students that will be created as a result of the COVID-19 school closures, and recommends further funding targeted to the neediest students in order to mitigate this outcome. However, the Institute's report falls short of estimating aggregate impacts on lifetime wages for students overall, or by level of advantage.

In this paper, I use Australian data from the period of 14 March to 30 May 2020 to gauge the impact in evidence so far on jobs and wages in different segments of the Australian labour market, and the projected impact on the adult wages of today's schoolchildren whose education has been disrupted due to school closures. In the first part of the paper, focussing on descriptive analysis of core labour market outcomes that have already been seen, I examine the differences in raw changes in jobs and wages during the window of observation across worker types and industries. In the second part of the paper, I produce a range of estimates of the impact of COVID-19-related school closures on children's later lifetime wages based on different assumptions about the equivalence of disrupted (online) learning to normal in-person learning, plus previous findings about the impact of additional years of schooling on later-life wages. Both sections of the paper deliver only partial, lower-bound estimates of the costs of the COVID-19 disruptions.

2. Gauging the impact on Australian jobs and wages

In Australia, COVID-19-related behavioural modifications – which could have affected both labour supply and, via its effect on consumer demand, labour demand – and government policy responses to the virus occurred between February and May 2020.[2] Government policy responses include both restrictions on economic activity, including lockdowns, and stimulus programs such as JobKeeper. States and territories were able to set their own preferred restrictions on activity (such as domestic border closures, social-distancing rules applicable to businesses, and rules about acceptable reasons to be outside one's home), meaning that policies with potential effects on the

2 Effects of the renewed lockdowns in Victoria starting in July 2020 – or any further lockdowns beyond May in any state or territory – are excluded from the estimates in this paper.

labour market varied across states and territories. Changes to individual behaviour may also have been different in different states and territories since signals of danger (e.g. rates of infection and death) that workers and employers may have reacted to were different in different areas. In addition, the labour market effects of behavioural and policy changes in response to the virus are likely to have been varied across industry and worker type.

I tabulate data from two sources – the Monthly Labour Force survey, and the new Weekly Payroll Jobs and Wages in Australia survey, both produced by the Australian Bureau of Statistics – to describe the impact of the first few months of COVID-19-related disruptions on Australian workers, bearing in mind the types of potential heterogeneity in impact discussed above. The advantage of the former data source is that it has been run for many years and hence comparative data are available that enable seasonal adjustment and year-over-year comparisons. The advantage of the latter data source is its weekly frequency, its inclusion of wage data, and its breakdown of data by detailed worker type (including granular age group) and by industry.

2a Monthly Labour Force survey

Table 1 captures the baseline impact on the Australian labour market month-by-month during the four-month window of February through May 2020. Panel A displays monthly employment figures and year-over-year per cent changes in the number of employed persons for the Australian labour force overall and for different subsets of workers defined by age, state, gender and full-time versus part-time status. Panel B shows unemployment and participation rates overall, for young workers, and separately for men and women.

Table 1: Changes in Employment, Unemployment, and Participation

	Total Labour Force				*15-24 year olds*			
	Feb-20	*Mar-20*	*Apr-20*	*May-20*	*Feb-20*	*Mar-20*	*Apr-20*	*May-20*
PANEL A								
Employed persons (000s)	12992.3	12989.2	12381.8	12154.1	1939.6	1955.4	1729.2	1626.2
% chg yr/yr in employed persons	1.9%	1.6%	-3.3%	-5.4%	-0.8%	0.3%	-11.3%	-16.8%
% chg yr/yr in employed males	1.2%	0.9%	-3.1%	-5.4%	-2.6%	-0.8%	-10.5%	-16.1%
% chg yr/yr in employed females	2.6%	2.4%	-3.6%	-5.4%	1.3%	1.4%	-12.1%	-17.3%
% chg yr/yr in full-time employed persons	1.5%	0.9%	-1.7%	-2.7%	-4.8%	-4.2%	-9.8%	-12.4%
% chg yr/yr in part-time employed persons	2.6%	3.1%	-6.9%	-11.2%	2.8%	4.1%	-12.5%	-20.2%
NSW employed persons (000s)	4128.1	4125.5	3900.3	3856.4	*624.8*	*630.2*	*541.1*	*504.1*
% chg yr/yr in NSW employed persons	0.9%	0.9%	-5.1%	-7.0%	*-1.5%*	*1.8%*	*-14.8%*	*-20.2%*
VIC employed persons (000s)	3434.7	3445.8	3317.8	3247.1	*509.0*	*501.0*	*457.6*	*429.8*
% chg yr/yr in VIC employed persons	1.8%	1.9%	-1.5%	-4.3%	*-3.3%*	*-3.6%*	*-9.6%*	*-17.4%*
QLD employed persons (000s)	2565.1	2558.9	2419.1	2390.9	*397.4*	*396.3*	*356.1*	*343.4*
% chg yr/yr in QLD employed persons	2.7%	1.9%	-3.8%	-5.2%	*-4.3%*	*-1.1%*	*-11.9%*	*-15.7%*
SA employed persons (000s)	849.6	854.4	817.3	806.1	*127.4*	*128.3*	*118.0*	*110.5*
% chg yr/yr in SA employed persons	0.7%	0.1%	-4.5%	-6.3%	*-0.8%*	*-2.7%*	*-8.8%*	*-15.6%*
WA employed persons (000s)	1376.1	1367.4	1302.2	1272.0	*208.6*	*204.3*	*176.4*	*166.2*
% chg yr/yr in WA employed persons	2.8%	2.0%	-3.3%	-5.4%	*13.1%*	*8.8%*	*-8.4%*	*-9.9%*
NT employed persons (000s)	133.0	135.7	132.1	129.9	*16.4*	*16.4*	*16.2*	*15.6*
% chg yr/yr in NT employed persons	1.2%	2.5%	2.6%	1.1%	*-10.4%*	*-4.2%*	*-7.3%*	*-3.4%*
ACT employed persons (000s)	237.3	238.3	231.1	227.5	*39.1*	*37.2*	*34.9*	*32.6*
% chg yr/yr in ACT employed persons	5.0%	5.3%	1.4%	-0.1%	*11.3%*	*5.4%*	*-1.2%*	*-7.6%*
PANEL B								
Unemployment rate	5.1%	5.2%	6.4%	7.1%	12.3%	11.6%	14.1%	16.1%
Male unemployment rate	5.2%	5.3%	6.6%	7.2%	13.6%	12.9%	15.4%	16.3%
Female unemployment rate	4.9%	5.1%	6.0%	6.9%	10.8%	10.2%	12.9%	15.4%
Participation rate	65.9%	65.9%	63.6%	62.9%	68.4%	68.4%	62.5%	59.9%
Male participation rate	70.8%	70.8%	68.9%	68.1%	67.6%	68.1%	63.1%	59.9%
Female participation rate	61.3%	61.2%	58.4%	57.8%	69.1%	68.7%	61.9%	60.0%

Source: Australian Bureau of Statistics Monthly Labour Force Survey. All data are seasonally adjusted except figures in italics.

The seasonally adjusted figures in the top portion of Panel A, for Australia overall, indicate that the impact of the COVID-19 phenomenon began seriously impacting the Australian labour market in April 2020, with year-over-year reductions in the number of employed persons in April and May of 3.3 per cent and 5.4 per cent respectively. For young (15-24 year old) Australian workers, for whom figures are shown on the right-hand side of the panel, the comparative year-over-year changes were almost three times as large, at -11.3 per cent and -16.8 per cent, respectively, in April and May. The year-over-year changes during these key months on male and female workers were reasonably comparable, though for younger workers the impact

was slightly greater for women. Workers in full-time employment were far less impacted than those with part-time employment, with the former group reduced by 1.7 per cent and 2.7 per cent in April and May, respectively, while part-time workers reduced in number by 6.9 per cent and 11.2 per cent in the same months. For young workers this difference by full-time/part-time status was even more striking, with a staggering 20.2 per cent year-over-year drop in May 2020 in the seasonally adjusted number of young people in part-time employment.

The second part of Panel A of Table 1 breaks down these figures for workers overall, and for young workers (not seasonally adjusted), by state and territory. The total number of people in jobs was impacted negatively in April and May in all states, but in the Northern Territory and the ACT, negative and significant impacts were seen only for young people. In the Northern Territory, the year-over-year contractions in employed young people seen in April and May continued (though at a reduced rate) the downward trend evident in February and March, and hence are more likely to reflect underlying structural factors rather than COVID-19 disruptions.

Panel B of Table 1 shows the monthly unemployment and participation rates overall, for women and men, and for young workers during this period. The overall 2 percentage point increase in unemployment, coupled with a 3 percentage point drop in the overall participation rate, between February and May 2020 reflected similar trends in both series for both men and women. Young people began in February 2020 at a much higher rate of unemployment (12.3 per cent, compared to 5.1 per cent for the labour force overall), likely reflecting structural factors. Young men's unemployment rate climbed 3 percentage points and young women's climbed almost 5 percentage points between February and May, with drops in the participation rate for each group of roughly 8 and 9 percentage points, respectively. As a per cent of baseline rates, the unemployment rates of the young rose (31 per cent) even less than those of the Australian labour force overall (39 per cent), while participation rates of the young plunged much more starkly. These figures suggest that young workers responded disproportionately to the COVID-19 disruptions to employment security and opportunities by withdrawing from the labour force.

2b Weekly Payroll Jobs and Wages in Australia survey

The Weekly Payroll Jobs and Wages survey is a new product from the Australian Bureau of Statistics, produced from the observed submissions of employers to the Australian Taxation Office via the Single-Touch Payroll (STP) digital system. All employers that use the STP system are included in the survey.[3] The survey includes information on both the number of payroll jobs, and the total amount of wages paid, on a weekly basis and broken down by granular age group and industry.

Tables 2 and 3 present the per cent changes, each week and over the whole

3 From the Explanatory Notes published by the ABS to accompany the survey data: "Approximately 99 per cent of employers the ATO classifies as 'substantial employers' (those with 20 or more employees) are reporting through STP. Small employers (those with 19 or less [sic] employees) began transitioning to STP on 1 July 2019 and over 80 per cent are reporting through STP. As a result, not all jobs in the Australian labour market are captured within these estimates."

period between 14 March and 30 May, in the number of jobs and amount of wages paid, respectively, reported by employers in this new survey. Each table tabulates figures for the labour force as a whole, for men and women separately, for each of seven age-range buckets, and for eleven selected industries. The included industries are ranked by total per cent decrease in the quantity in focus on each table (jobs for Table 2, and wages for Table 3) and are selected for inclusion based on either witnessing large reductions, being the least affected (*Financial & insurance services*), or being of particular interest due to the nature of the COVID-19 disruptions (e.g. *Health care & social assistance* and *Education & training*).

Table 2, tabulating losses in numbers of jobs, shows that aggregate losses commenced at the start of the period and continued to occur on a weekly basis through mid-April, after which job numbers began to recover. This basic pattern held true for both men and women, for each age group, and for most negatively affected industries. However, the magnitude of job loss varied substantially by age group and industry. While jobs of people aged 40-49 and 50-59 were lost week-over-week by a maximum of 1.7 per cent and 1.6 per cent, respectively (observed in the week of 28 March to 4 April), people in every other age group experienced far more dramatic maximum weekly job losses. Jobs in the youngest age group (aged under 20 years) fell week-over-week by 7.4 per cent, 9.9 per cent, and 7.6 per cent in succession between mid-March and mid-April. Total job losses over the 14 March to 30 May period were 3.9 per cent for those in their 50s, as compared with 16.5 per cent for workers under 20 years old, between 12 and 13 per cent for workers aged 20-29 or over 70, and in the mid-single digits for all other age ranges. Looking across industries, in the bottom section of Table 2, reveals that the largest job losses by far occurred in the *Accommodation & food services* industry, with a total net decline of 29.1 per cent over the period and the largest contractions in the final week of March and the first week in April. *Arts & recreation* was the second worst-off industry, with equivalent timing and a total net loss over the period of 26.3 per cent of jobs in existence as at 14 March. *Education & training* and *Health care & social assistance* both lost 4.7 per cent of jobs over the period, with the biggest week-over-week losses in the former industry (and in *Administrative & support services*) commencing about a week later in the observation window than jobs in the most affected industries. *Finance & insurance services*, the least-affected industry and one of only two industries not to lose jobs during the period (the other being *Electricity, gas, water & waste services*, for which figures are not separately tabulated on the table), gained on net 0.5 per cent more jobs.

Table 3 shows equivalent breakdowns by worker and industry type for per cent changes in total payroll wages paid week-by-week, and in total, over the same period – where the underlying wage totals feeding into the percentage changes in Table 3 include JobKeeper payments.[4] The top rows of Table 3 show a net decline in total wages of 8.3 per cent over the period, with a steeper decline for men (-9.8 per cent) than for women (-5.9 per cent). The pattern of loss in wages by age group contrasts with the pattern of job loss shown in Table 2, with wages declining most in mid-life age ranges (between 30 and 59) and rising for only one group: workers under 20.

4 This is an unavoidable consequence of the way in which the data are provided by the ABS.

Table 2: Percent change each week in number of payroll jobs

	14 - 21 Mar	*21 - 28 Mar*	*28 Mar - 4 Apr*	*4 - 11 Apr*	*11 - 18 Apr*	*18 - 25 Apr*	*25 Apr - 2 May*	*2 - 9 May*	*9 - 16 May*	*16 - 23 May*	*23 - 30 May*	*Total percent change, 14 Mar - 30 May*
Total	-0.4%	-2.5%	-3.0%	-2.4%	-0.9%	0.2%	0.4%	0.3%	0.3%	0.0%	0.4%	-7.5%
Male	-0.4%	-2.0%	-2.2%	-1.8%	-0.6%	0.1%	0.1%	0.0%	0.2%	-0.2%	0.4%	-6.3%
Female	-0.5%	-2.8%	-3.5%	-2.7%	-1.1%	0.3%	0.6%	0.6%	0.3%	0.2%	0.4%	-8.0%
By age group:												
Age <20	-1.1%	-7.4%	-9.9%	-7.6%	-1.1%	0.9%	2.5%	1.7%	2.3%	1.1%	2.0%	-16.5%
20-29	-0.7%	-4.1%	-5.1%	-3.6%	-1.4%	0.3%	0.3%	0.7%	0.6%	0.1%	0.1%	-12.2%
30-39	-0.3%	-1.9%	-2.2%	-1.7%	-0.8%	0.1%	0.2%	0.2%	0.2%	-0.1%	0.3%	-5.8%
40-49	-0.3%	-1.5%	-1.7%	-1.4%	-0.6%	0.2%	0.3%	0.2%	0.1%	-0.1%	0.5%	-4.2%
50-59	-0.3%	-1.5%	-1.6%	-1.4%	-0.6%	0.2%	0.4%	0.2%	0.0%	-0.1%	0.6%	-3.9%
60-69	-0.5%	-1.8%	-2.2%	-2.0%	-1.0%	0.1%	0.6%	0.4%	0.0%	0.1%	0.4%	-5.9%
70+	-0.3%	-1.6%	-3.3%	-3.6%	-1.1%	0.0%	-0.6%	-1.4%	-0.4%	-0.4%	-0.4%	-12.5%
In selected industries (sorted on total percent decrease in payroll jobs over the period):												
Accommodation & food services	-2.7%	-13.5%	-16.1%	-9.2%	-0.8%	3.6%	2.5%	1.1%	0.7%	1.1%	2.1%	-29.1%
Arts & recreation services	-3.9%	-8.8%	-9.5%	-5.3%	-3.7%	3.8%	0.9%	-0.5%	-0.8%	-1.5%	0.0%	-26.3%
Information media & telecommunications	-0.6%	-2.2%	-2.8%	-2.6%	-0.6%	0.5%	-0.5%	-3.0%	0.0%	0.0%	0.8%	-10.5%
Administrative & support services	-0.2%	-1.7%	-4.4%	-3.1%	-2.2%	0.3%	0.5%	0.5%	0.5%	-0.3%	-0.3%	-10.1%
Rental, hiring & real estate services	-1.1%	-2.8%	-3.6%	-2.5%	-1.3%	-0.2%	-0.1%	0.2%	0.3%	-0.3%	0.9%	-10.1%
Other services	-0.1%	-2.2%	-3.3%	-3.7%	-1.2%	-0.3%	-0.3%	1.2%	0.7%	-0.1%	-0.6%	-9.7%
Agriculture, forestry & fishing	0.6%	-0.2%	-2.3%	-3.0%	-0.7%	0.1%	-0.6%	-1.3%	-0.6%	-1.0%	-1.1%	-9.5%
Retail trade	0.4%	-3.8%	-2.8%	-3.6%	-0.3%	0.6%	0.2%	1.1%	0.9%	0.6%	0.5%	-6.3%
Education & training	0.8%	-0.7%	-2.1%	-3.1%	-3.2%	-1.3%	0.6%	1.5%	0.9%	0.6%	1.3%	-4.7%
Health care & social assistance	-0.3%	-1.3%	-1.8%	-1.8%	-0.8%	0.3%	0.9%	0.7%	-0.3%	0.2%	-0.5%	-4.7%
Financial & insurance services	0.4%	-0.5%	-0.6%	0.3%	0.1%	0.2%	0.5%	-0.4%	-0.1%	-0.2%	1.0%	0.5%

Source: Australian Bureau of Statistics Weekly Payroll Jobs and Wages Survey.

Table 3. Percent change each week in total wages paid

	14 - 21 Mar	*21 - 28 Mar*	*28 Mar - 4 Apr*	*4 - 11 Apr*	*11 - 18 Apr*	*18 - 25 Apr*	*25 Apr - 2 May*	*2 - 9 May*	*9 - 16 May*	*16 - 23 May*	*23 - 30 May*	*Total percent change, 14 Mar - 30 May*
Total	-0.1%	-1.1%	-1.8%	-2.7%	-0.3%	0.4%	0.3%	-2.0%	-1.3%	-0.7%	0.7%	-8.3%
Male	0.1%	-1.1%	-2.0%	-3.5%	-0.5%	0.0%	-0.1%	-2.1%	-0.8%	-1.0%	0.9%	-9.8%
Female	-0.4%	-1.2%	-1.4%	-1.3%	0.0%	0.9%	0.9%	-1.8%	-2.0%	-0.1%	0.3%	-5.9%
By age group:												
Age <20	-3.1%	-2.6%	0.9%	1.1%	4.9%	9.3%	0.7%	-2.0%	-4.5%	-1.3%	2.8%	5.4%
20-29	-1.1%	-2.6%	-1.7%	-2.3%	0.3%	1.9%	0.5%	-1.3%	-1.5%	-0.6%	0.8%	-7.5%
30-39	0.0%	-1.2%	-1.4%	-2.5%	-0.8%	-0.3%	0.6%	-1.9%	-1.1%	-0.7%	0.7%	-8.3%
40-49	0.2%	-1.0%	-2.3%	-2.8%	-0.6%	-0.5%	0.3%	-2.3%	-1.0%	-0.6%	0.6%	-9.5%
50-59	0.1%	-1.0%	-1.9%	-2.6%	-0.4%	-0.1%	0.3%	-2.0%	-1.3%	-0.6%	0.7%	-8.6%
60-69	-0.1%	-0.9%	-1.5%	-2.7%	-0.3%	0.6%	0.8%	-1.9%	-1.7%	-0.4%	0.2%	-7.7%
70+	1.3%	3.4%	-2.1%	-5.3%	0.8%	3.1%	-2.4%	-3.6%	-1.1%	-1.2%	-0.1%	-7.2%
In selected industries (sorted on total percent decrease in payroll jobs over the period):												
Accommodation & food services	-7.0%	-11.8%	-7.2%	-5.3%	1.9%	14.6%	-4.3%	-2.7%	-5.0%	-0.8%	0.9%	-25.4%
Arts & recreation services	-4.1%	-4.6%	-2.1%	-1.3%	15.7%	0.9%	-2.1%	-10.8%	-4.8%	-2.1%	2.4%	-14.0%
Information media & telecommunications	0.8%	0.1%	-3.0%	-3.0%	-2.0%	0.7%	0.5%	-7.8%	-0.6%	0.2%	1.7%	-12.0%
Administrative & support services	2.1%	0.9%	-3.3%	-6.0%	-3.5%	3.3%	5.6%	-0.5%	-3.8%	-2.3%	-0.1%	-8.1%
Rental, hiring & real estate services	-0.6%	-0.7%	-0.6%	-3.5%	-1.0%	1.2%	-0.2%	-6.3%	-0.7%	-2.9%	0.9%	-13.7%
Other services	0.7%	1.8%	1.0%	-4.0%	-1.2%	1.8%	-0.2%	-0.5%	-2.1%	-0.5%	-0.6%	-4.0%
Agriculture, forestry & fishing	2.2%	2.2%	-1.4%	-4.6%	-0.3%	2.6%	-0.9%	-2.1%	-1.1%	-1.3%	-1.7%	-6.4%
Retail trade	-0.6%	-2.5%	-1.7%	0.9%	1.2%	2.0%	-1.9%	-1.4%	-2.2%	-1.7%	3.6%	-4.3%
Education & training	2.2%	-0.3%	-1.3%	-1.8%	-1.8%	-1.0%	1.9%	1.0%	0.8%	-0.2%	1.2%	0.7%
Health care & social assistance	-0.8%	-0.9%	0.0%	1.0%	0.1%	-0.4%	0.7%	-0.4%	-2.0%	1.7%	-2.4%	-3.4%
Financial & insurance services	6.6%	0.9%	-7.1%	-1.7%	-2.9%	-3.5%	0.0%	-3.4%	0.1%	0.9%	2.4%	-8.1%

Source: Australian Bureau of Statistics Weekly Payroll Jobs and Wages Survey.

Patterns in wage changes by industry are similar to the patterns in job losses shown in Table 2, except that the industry least affected by job losses (*Financial & Insurance Services*) did see a substantial wage contraction (-8.1 per cent), and that the *Education & Training* industry saw a net increase in wages paid (+0.7 per cent), in spite of job losses. Many education providers are likely to have responded to the COVID-19 disruptions by cancelling or failing to renew contracts for casual front-line teaching staff, but these data indicate that any such reductions did not translate into savings in terms of the total wage bill across the industry.

Figures 1 and 2 show graphically the patterns of movement in jobs and payroll wages, respectively, for selected worker types and industries over this period. Figure 1 demonstrates visually the disproportionate job losses for young workers and for workers in *Accommodation & Food Services* and *Arts & Recreation*. Figure 2 shows visual evidence in the series for young workers and for these two most heavily affected industries that JobKeeper payments kicked in (retroactively) around the second to third weeks in April, with total wages pushed higher than initial levels – and remaining higher than starting levels for the youngest workers even at the end of the period. The numbers in Figure 2 are underestimates of the gain in wages per employed young worker over this period, since the substantial job losses early in the period meant that the larger total wage payouts starting in mid-April were made to a smaller number of people (i.e., only to those still employed or on JobKeeper).

Figure 1: Trends in Number of Jobs for Selected Worker Types and Industries

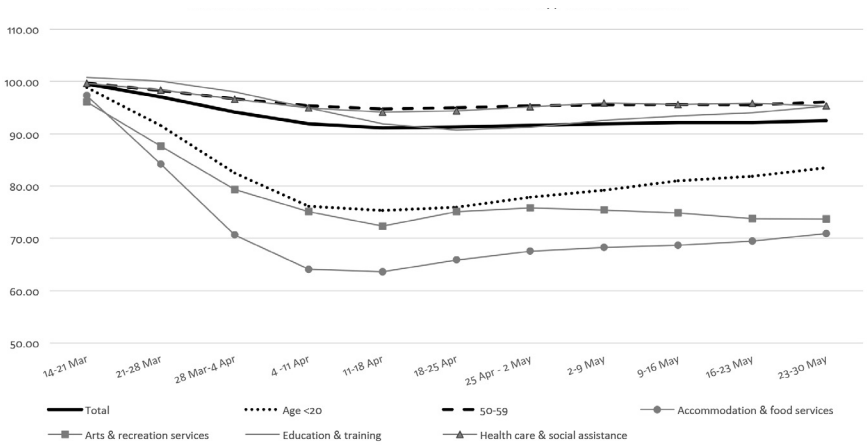
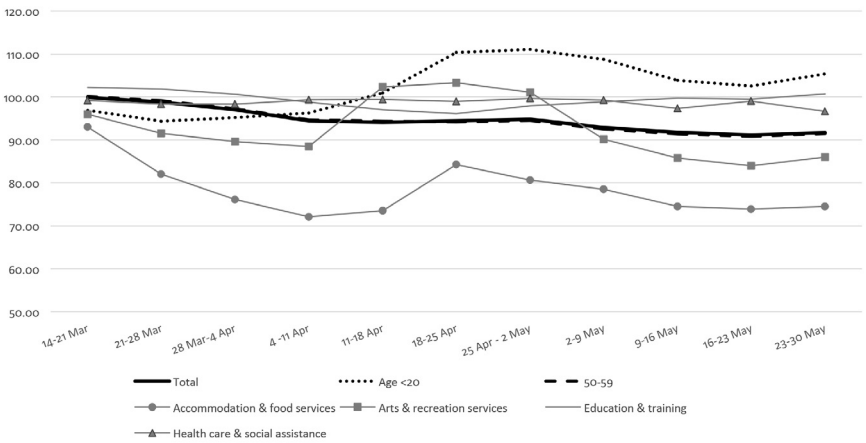


Figure 2: Trends in Total Payroll Wages for Selected Worker Types and Industries



The evidence reviewed in this section indicates that mid-life workers were mostly likely to hold on to their jobs during this period and young workers were most likely to lose their jobs, which often caused these latter workers to leave the labour force. The youngest workers who did remain in jobs saw a net rise in pay over the period, reflecting the impact of Jobkeeper's flat-payment structure that mechanically increased the wages of workers previously earning less than $1500 per fortnight. The impacts on both jobs (negatively) and wages (positively) were particularly dramatic for workers in *Accommodation & food services* and *Arts & recreation*, with the total wage bill in these industries still substantially lower at the end of the period notwithstanding JobKeeper, perhaps due not only to the smaller worker group but to the gradual re-ignition of some activity – accompanied by workers coming off JobKeeper and back onto their lower-income regular jobs – in these sectors starting in May.

3. Estimating the impact on schoolchildren's later-life wages

While immediate effects of COVID-19 policies on jobs and wages can be tabulated, we have yet to witness the longer-run impact on the Australian labour market of policy decisions made in the first half of 2020. One type of COVID-19 policymaking likely to have significant long-run effects on labour market outcomes is mandates to disrupt primary and secondary education for extended periods.

Gauging the likely size of the long-run impacts of these disruptions is challenging at best, given the far-future nature of the required projections and the multi-faceted nature of the impacts. For the purposes of this paper, I make no attempt to estimate anything but the impact on future wage outcomes, meaning that adult-

era negative impacts from phenomena such as increased domestic violence, reduced mental health, or the development of less healthy habits due to the experiences of children during this period are completely excluded from my estimates.

To deliver rough estimates of the lifetime wage impact of COVID-19 disruptions on Australian schoolchildren, I proceed as follows.

1. Estimate the raw number of pupil-days conducted online, by state, recognising the potential for differences across school sector (public/independent/Catholic) where these can be reliably observed. Tabulate disrupted pupil-days by year level and by socio-economic advantage, the latter proxied imperfectly, due to data limitations, by Indigenous/TSI status.
2. Take the estimate from prior research, also used in Psacharopoulos *et al*. (2020), that every year of schooling yields approximately 9 per cent more future earnings, and assume a linear reduction in learning for each day disrupted. Using these figures together with the result of Step 1, plus conservative parameters for the length of working life (45 years), the appropriate yearly discount rate for wages earned across that working life (3 per cent), the initial annual wage (AUD$52,000) and the yearly increase in that wage (1 per cent), calculate a rough baseline estimate of the future earnings losses that will be suffered by the "coronavirus cohort" of Australian schoolchildren who have been directly impacted by the COVID-19-related school closures.
3. Explore the sensitivity of this baseline estimate to changes in the assumptions.

Because school closures are enacted and enforced at a state or territory level, and because the fraction of the student body that is advantaged differs across regions, I construct separate estimates for Step 1 for each state and territory.

Table 4: School Disruption Patterns by State and Territory

	(1) *NSW*	*(2)* *VIC*	*(3)* *QLD*	*(4)* *TAS*	*(5)* *SA*	*(6)* *WA*	*(7)* *ACT*	*(8)* *NT*
Date								
23-Mar								
24-Mar		HH						
25-Mar		HH						
26-Mar		HH						
27-Mar		HH						
30-Mar		H						
31-Mar		H						
1-Apr		H						
2-Apr		H						
3-Apr		H				HH		
6-Apr		H	H	HH**	**	HH		**
7-Apr		H	H	HH**	**	HH		**
8-Apr		H	H	HH**	**	HH		**
9-Apr		H	H	HH**	**	HH		**
10-Apr	H	H	H	H	H	H	H	H
13-Apr	H	H	H	H	H	H	H	H
14-Apr	H	*	H	H	H	H	H	H
15-Apr	H		H	H	H	H	H	H
16-Apr	H		H	H	H	H	H	H
17-Apr	H		H	H	H	H	H	H
20-Apr	H			H	H	H	H	BACK
21-Apr	H			H	H	H	H	
22-Apr	H			H	H	H	H	
23-Apr	H			H	H	H	H	
24-Apr	H			H	H	H	H	
27-Apr	*			*	H	*	H	
28-Apr	*				BACK	*		
29-Apr						BACK		
30-Apr								
1-May								
4-May								
5-May								
6-May								
7-May								
8-May								
11-May								
12-May								
13-May								
14-May								
15-May								
18-May								
19-May								
20-May								
21-May								
22-May								
25-May	BACK	*	BACK					
26-May								
27-May								
28-May								
29-May								
1-Jun							H	
2-Jun							BACK	
3-Jun								
4-Jun								
5-Jun								
8-Jun								
9-Jun		BACK		BACK				

Notes: Dark shading indicates all children advised or required to learn online (with some exceptions for children of "essential workers"); light shading indicates phased return to school, with distinctions in fraction of learning online for different year levels (i.e., earliest and/or most advanced year levels versus other children); H = normal school or public holiday (public schools); HH = additional school holiday; * = normal pupil-free day (public schools); ** - additional pupil-free day (public schools); BACK = normal schooling resumes for all year levels

Table 4 tabulates in a visual format, the main schooling disruptions in each Australian state and territory, based on data gathered from the websites of each of the eight state- and territory-level Departments of Education. The table shows that schooling in South Australia, Western Australia, and the Northern Territory was substantially less disrupted than schooling in other states and the ACT. Of the more affected states and the ACT, between 20 and 28 days were disrupted for students in all year levels, with an additional 10 to 12 days partially or fully disrupted for portions of students (defined by year level) before schools reopened for all year levels. By contrast, students in South Australia, Western Australia and Northern Territory each lost between 4 and 9 days of normal schooling, regardless of year level, across the whole period.

The full impact of the disruptions shown in broad brush on Table 4 depends on a number of factors. First, the detailed nature of the disruptions was slightly different in each state (e.g., during the partial school closures that followed wholesale closures in a number of states, some allowed only Year 11 and/or Year 12 students back, and others allowed back students in other selected years of schooling as well, most frequently including the youngest students). Second, the number and type of enrolments affected differed by state and territory, with different fractions of students socio-economic advantaged/disadvantaged, and different quantities of enrolment in different sectors (public, independent, and Catholic). Third, the impact of each disrupted pupil-day depends on the effectiveness with which the online learning on that day substituted for the in-person learning which would have occurred in the absence of the disruption.

On the first point, while for expositional simplicity not all idiosyncrasies of school disruptions are depicted on Table 4, the policy idiosyncrasies made public on the websites of the Departments of Education in each state and territory inform estimates in the sub-sections below of the state- or territory-level impact of disruptions on students of different types, and are available in detailed form upon request from the author. On the second point, Table 5 shows student enrolment levels by state and territory in 2019, grouping together student numbers for the least-affected regions of South Australia, Western Australia, and the Northern Territory. The enrolment numbers shown in Table 5 are used (with breakouts by school sector when appropriate) in each sub-section below.

On the final point – to what extent does online learning substitute for in-person learning? – I apply a range of estimates in Section 2G in order to generate rough whole-of-country estimates for the future wage losses of the Australian schooling disruptions during this period. To be conservative, I assume that extra holidays are equivalent to disrupted school days in terms of their net effect on children relative to the counterfactual benefit of school (though in reality, extra holidays are unlikely to replace normal schooling as completely as does disrupted schooling).

Table 5: Enrolment figures by state/territory and A/TSI status

	NSW		*VIC*		*QLD*		*TAS*		*ACT*		*SA / WA / NT*	
Grade	*A/TSI*	*Non-A/TSI*	*A/TSI*	*Non-A/TSI*	*A/TSI*	*Non-A/TSI*	*A/TSI*	*Non-A/TSI*	*A/TSI*	*Non-A/TSI*	*A/TSI*	*Non-A/TSI*
Pre-year 1	6,800	93,476	1,584	79,510	6,070	60,709	580	5,781	193	5,972	4,862	128,011
Year 1	6,706	94,385	1,484	80,222	6,063	60,988	612	5,701	204	5,810	4,819	129,020
Year 2	6,323	93,277	1,347	77,765	6,054	60,809	576	5,904	182	5,681	4,893	127,466
Year 3	6,015	92,730	1,347	77,251	6,029	61,932	620	5,772	195	5,653	4,935	126,903
Year 4	6,042	92,257	1,367	77,436	6,019	63,748	659	5,993	182	5,711	4,872	126,385
Year 5	5,951	91,872	1,398	76,521	5,966	62,925	715	6,147	164	5,447	5,013	125,477
Year 6	6,104	92,312	1,350	77,443	5,989	63,383	668	6,100	169	5,321	4,725	126,795
Ungraded primary	1,784	10,097	311	5,595	4	175	0	11	0	0	975	10,134
Year 7	6,088	89,503	1,342	75,430	5,865	62,724	621	6,030	193	5,558	4,065	122,962
Year 8	5,635	86,334	1,290	72,918	5,426	61,216	612	5,864	172	5,343	4,458	118,478
Year 9	5,467	83,328	1,181	70,334	5,211	58,647	561	5,449	182	5,063	3,965	113,921
Year 10	5,203	83,461	1,127	70,772	4,619	58,063	508	5,584	161	5,106	3,575	113,218
Year 11	3,557	73,447	985	65,529	3,866	51,802	414	4,967	143	4,904	3,358	102,098
Year 12	2,364	63,955	680	56,818	2,208	36,145	326	4,309	117	4,383	2,309	89,204
Ungraded secondary	2,561	13,378	391	6,680	3	51	0	10	0	0	157	13,548
TOTAL	76,600	1,153,812	17,184	970,224	69,392	763,317	7,472	73,622	2,257	69,952	56,981	1,573,620

Source: Australian Bureau of Statistics, 4221.0 Schools, Australia, 2019, Table 42b.

3a New South Wales

Table 4 shows that New South Wales was the first state to move students online, on 23 March. Starting earlier in March, a smattering of individual schools in the state had closed due to local diagnoses of the virus, and on 15 March the state's Department of Education had banned assemblies, gatherings, excursions, and inter-school sports and activities involving more than three schools. Starting on 23 March, parents were encouraged (though not required) to keep their children home to learn online, and online platforms were also used for pupils who attended school in person.

In terms of differences between school sectors, while there may have been individual variation in the choices of principals in independent and Catholic schools, during the period only a single day (28 April) was clearly scheduled as in session for private schools but not for public schools, with no impact on this difference due to the virus.

The partial reopening of New South Wales schools shown on Table 4 as spanning the period 7 to 22 May involved Year 12 students attending school for 2 days per week and all other students attending 1 day per week.

Conservatively ignoring all impacts on normal schooling prior to 23 March and the evidently small differences between sectors, and multiplying the appropriate number of disrupted days by the pupils enrolled in each year level in New South Wales schools, yields a total of approximately 35 million pupil-days disrupted for non-ATSI students and 2.3 million days disrupted for ATSI students. These totals and the breakdown of disrupted days by year level are shown in the first two columns of Table 6.

Table 6: Disrupted School Days, by Year Level and State/Territory

	NSW		*VIC*		*QLD*		*TAS*		*ACT*		*SA*		*WA*		*NT*	
Grade	*A/TSI*	*NOT-A/TSI*	*A/TSI*	*NOT-A/TSI*	*A/TSI*	*NOT-A/TSI*	*A/TSI*	*NOT-A/TSI*	*A/TSI*	*NOT-A/TSI*	*A/TSI*	*NOT-A/TSI*	*A/TSI*	*NOT-A/TSI*	*A/TSI*	*NOT-A/TSI*
Pre-year 1	205943	2830987	49104	2464810	121400	1214180	11020	109839	5211	161244	4188	82320	22284	290538	5356	9012
Year 1	203096	2858517	46004	2486882	121260	1219760	11628	108319	5508	156870	4104	79288	22212	292221	5300	8664
Year 2	191497	2824961	41757	2410715	181620	1307040	10944	112176	4914	153387	4352	79032	21609	288009	5616	8752
Year 3	182169	2808394	55227	3167291	180870	1330350	11780	109668	6240	180896	4072	77460	22275	288936	5768	8276
Year 4	182986	2794069	56047	3174876	180570	1361040	12521	113867	5824	182752	4156	78916	21465	288531	5792	8276
Year 5	180230	2782409	57318	3137361	178980	1329030	13585	116793	6068	201539	4480	79120	22113	284778	5744	7852
Year 6	184864	2795735	55350	3175163	179670	1334850	12692	115900	6253	196877	4032	80612	21384	291753	5364	8264
U Prim	54030	305795	12751	229395	120	120	0	209	0	0	3900	77944	0	333	0	0
Year 7	184379	2710662	55022	3092630	175950	1180440	18630	180900	5211	150066	1192	12480	21726	284733	5412	7288
Year 8	170660	2614687	52890	2989638	162780	1161900	18360	175920	6364	197691	3952	77084	20511	272799	4764	7332
Year 9	165572	2523648	48421	2883694	156330	1104540	16830	163470	6734	187331	3656	73056	17793	260424	4296	6628
Year 10	157577	2527676	46207	2901652	138570	1091220	15240	167520	5152	163392	3396	77508	14949	253143	4260	6520
Year 11	107726	2224395	30535	2031399	77320	1036040	7866	94373	3861	132408	3960	79076	13518	243081	3464	6568
Year 12	67543	1827286	21080	1761358	44160	722900	6194	81871	3159	118341	2760	68580	10179	215640	1952	5156
U Sec	77562	405162	16031	273880	90	90	0	90	0	0	596	7808	0	927	32	268
TOTAL	2,315,833	34,834,383	643,744	36,180,744	1,899,690	15,393,500	167,290	1,650,915	70,499	2,182,794	52,796	1,030,284	252,018	3,555,846	63,120	98,856

Source: Australian Bureau of Statistics, 4221.0 Schools, Australia, 2019, Table 42b.

3b Victoria

As in the case of New South Wales, a couple of Victorian schools were closed in early- to mid-March prior to whole-of-sector closures, due to outbreaks of the virus at those schools. Victoria then commenced school holidays early, on 24 March, and then began Term 2 on 15 April with no on-site classes. The partial re-opening beginning on 28 May involved the full-time return to school of students in all years up to and including Year 2, plus students in Year 11 and Year 12. There were no clear scheduled differences between school sectors in days disrupted.

Again ignoring any differences across sectors and all disruptions prior to the sector-wide early onset of school holidays on 24 March, and multiplying the number of disrupted days by the quantity of students enrolled in each year level, yields a total of roughly 36 million disrupted days for non-ATSI students and 643,744 disrupted pupil-days for A/TSI students in Victoria. Disrupted days by year level are shown in the Victoria-specific columns of Table 6.

3c Queensland

One school in Queensland was closed prior to sector-wide closures on 30 March due to a virus diagnosis at the school. On 30 March, schools went "student-free", with children of "front-line" workers still permitted to attend. On 20 April, Term 2 began with no on-site classes. The partial re-opening that began on 11 May involved students in pre-Year 1 and Year 1, plus Year 11 and 12, returning to school full-time, with other years still learning online. As with Victoria, no scheduled differences in virus-related disruptions between sectors were publicly announced in Queensland.

Applying the method described above for New South Wales and Victoria to Queensland yields a total of over 15 million disrupted pupil-days for non-A/TSI students, and almost 2 million disrupted pupil-days for A/TSI students, in Queensland, as shown in the Queensland-specific columns of Table 6.

3d Tasmania

A few independent schools in Tasmania switched to online learning on 30 March, a few days before the sector-wide early start of school holidays ("pupil-free days") on 6 April. Term 2 started on 28 April for government schools and a day earlier for Catholic and independent schools, in both cases with all classes online. Partial re-opening then began on 25 May with students in kindergarten through Year 6, Year 11, and Year 12 returning to school full-time.

Conservatively ignoring the excess disruption at non-government schools associated with the smattering of early closures on 30 March and the online learning on 27 April, a total of over 1.5 million pupil-days were disrupted in Tasmania for non-A/TSI students, and 167,290 days for A/TSI students, as shown in the Tasmania-specific columns of Table 6.

3e Australian Capital Territory

One school in the Australian Capital Territory closed on 23 March due to a student testing positive for the virus. On 23 March, schools went "student-free" for all years

and types of students. Partial re-opening commenced on 18 May with students in kindergarten through Year 2, Year 7, and Years 11 and 12 returning to school full-time. On 25 May, Years 3, 4, and 10 returned full-time, and on 2 June, all students returned to school.

The Australian Capital Territory-specific columns of Table 6 show the breakdown by year level of total disrupted pupil-days, which total just over 2 million days for non-A/TSI students and 70,499 days for A/TSI students.

3f Remaining states and territories

Analogous figures calculated for South Australia, Western Australia and the Northern Territory are separately enumerated in the final columns of Table 6. Across South Australia, Western Australia, and the Northern Territory, a total of just over 4.5 million disrupted pupil-days affected non-A/TSI students, and 367,934 pupil-days were disrupted for A/TSI students.

3g Aggregate estimated effects on schoolchildren (baseline and alternative estimates)

Based on the calculations above, the total number of disrupted pupil-days across Australia – adding up the state- and territory-level totals in the final row of Table 6 – comes to just over 100 million. Dividing this number by the product of 38 (approximate weeks of school in a normal year) and 5 (days per week of normal school when school is in session) yields an estimate of 528,381 pupil-years disrupted in Australia. Of these disrupted pupil-years, approximately 29,000, or 5.4 per cent, affected A/TSI students.

These 528,381 disrupted pupil-years can be translated into future wages of current schoolchildren foregone due to the disruptions, under assumptions about the severity of the disruptions to the value of schooling and the translation of years of schooling to future wages. On the latter, to recover a baseline figure I use the estimate used by Psacharopoulos *et al*. (2020) that an additional year of schooling translates into 9 per cent more wages per working year for the one receiving that schooling. Also, in a similar vein as Psacharopoulos *et al*. (2020), I assume that each foregone pupil-year will feed into 45 years of working life and wages, discounted at 3 per cent each year. I also assume conservatively that school-leavers' starting wage will be AUD$52,000 (slightly below the annualised average wage for young workers[5]) and will grow at 1 per cent per year in real terms.

Naturally, these assumptions are not inviolable. Psacharopoulos's (2020) assumption of 45 years of working life on average per child implies participation rates and unemployment rates that are higher and lower, respectively, than what this cohort may experience in Australia. For that reason, I reduce the average number of future years of working life to 35 in a robustness check below. Also, it may be argued that a portion of the return to years of schooling reflects relative rather than absolute years of education. To the extent that the entire Australian coronavirus cohort ends up in

5 The average weekly wage for workers aged 21-34 was AUD$1,127.60 according to the May 2018 Employee Earnings and Hours report of the Australian Bureau of Statistics (https://www.abs.gov.au/ausstats/abs@.nsf/mf/6306.0).

competition with itself, and if labour markets and related institutions do not bring about a reduction in wages to accommodate the reduction in absolute productivity that the schooling reductions for this cohort implies, Psacharopoulos's (2020) assumption of a 9 per cent wage return per year of schooling may be an over-estimate. To address this possibility, I run another robustness check below using a rate of return of 6 per cent rather than 9 per cent per year of schooling.

Applying these assumptions together with the assumption also used in Psacharopoulos *et al*. (2020) that 90 per cent of the value of a normal school-day is achieved on a disrupted day, and assuming that all students were to begin working tomorrow, yields a first-pass ballpark estimated value for foregone lifetime wages due to coronavirus-related schooling disruptions in Australia of approximately AUD$75 million. This number is highly sensitive to the assumption of how well online learning replaces normal schooling, jumping to almost AUD$150 million if disrupted school days have only 80 per cent of the value of normal school days, and AUD$373 million if disrupted days have only 50 per cent of the value of normal days. Using the initial 90 per cent equivalence figure and incorporating the differential timing of labour-market entry for secondary-school students and primary-school students, where the former are expected to enter three years from now on average and the latter eight years from now on average, the losses affecting each group are roughly AUD$30 million and AUD$37 million, respectively, for a total loss attributable to the disruptions of about AUD$67 million.

The baseline estimate of the unseen future wage cost of virus-related schooling disruptions is also sensitive to assumptions about the size and duration of future returns to schooling. The baseline estimate reduces by 50 per cent, from AUD$75 million to approximately AUD$50 million if the returns to schooling are assumed to be 6 per cent rather than 9 per cent. It falls to approximately AUD$63 million when children are assumed to work on average 35 years rather than 45 years as adults.

These estimates omit any impact of disruptions to aspects of students' learning apart from school – such as elevated risk of domestic violence due to confinement at home, elevated mental stress due to isolation from peers, uncertainty regarding how examination procedures or schedules will be modified, or any other impact on the value of schooling moving forward beyond this time period. The economics literature has long recognised that investments in education build on themselves – as Tian and Chen (2020) state in the title of their recent book chapter, "advantage begets advantage" – and so disruptions to children's learning in their early schooling years are likely to have a larger impact on lifetime wages, via their impact on the ability of those children to catch up to the education levels they otherwise would have achieved, than disruptions to children's learning in their later years of schooling.

Applying different fractional values to disrupted school days depending on the schooling year captures this idea very roughly. Assuming 80 per cent equivalence of disrupted to normal school days for primary schoolchildren and 90 per cent equivalence for secondary school children, and again assuming differential points of entry into the labour market, yields an estimate of approximately AUD$74 million in losses for primary-school students, and the previously estimated roughly AUD$30 million for secondary-school students, for a total estimated loss of just over AUD$100

million from COVID-19-related school disruptions. As noted above, an estimated approximately 5 per cent of these losses will be suffered by A/TSI students.

4. Concluding remarks

Australia's labour force has felt significant and regressive immediate effects from COVID-19 disruptions, with particularly acute negative impacts on young workers' participation rates and on workers in particular industries. The economic impact of these changes will continue to be felt for months and years to come, as the economy continues to lag the position it would have enjoyed, were it not for COVID-19 and responses to it.

The longer-run impacts of what has happened between February and May 2020 are myriad and complex, and therefore difficult to estimate precisely. Those who write history will eventually be in a position to judge the full set of trade-offs Australia has made during this crisis. In an attempt to peek forward into the future despite the inherent challenges of doing so, in the second part of this paper I provide an order-of-magnitude estimate of one aspect of the longer-run impact of COVID-19 disruptions: the impact on lifetime wages of Australian school children denied normal schooling during this period. The estimated future losses, using conservative assumptions, are on the order of AUD$50-$100 million.

Neither section of this paper has accounted for the decrease in labour productivity associated with keeping children at home, or for the costs of the considerable disruptions to universities (Chrysanthos 2020). Neither have I accounted for the likely within-year-level heterogeneity in impact of school closures, whereby less-advantaged students are likely to have been more negatively affected than advantaged students because the latter have more suitable home workspaces, more support from parents, and more of many other favourable resources to support their online learning compared to the former. The general equilibrium effects that are likely to afflict labour markets have also not been modelled here.

What is shown here is both a simple tabulation of (regressive) immediate impacts, and a method for estimating one small part of the less-obvious longer-run impacts, of our policy choices during this period. In future crisis moments faced by our country, losses such as these should be acknowledged, estimated at least roughly, and used to inform all policy-making that impacts the Australian economy.

References

Ashworth, Caitlin (2020), Suicide deaths during pandemic could exceed virus-related deaths. *The Thaiger*, 14 May 2020, accessed 6 July 2020, https://thethaiger.com/coronavirus/suicide-deaths-during-pandemic-could-exceed-virus-related-deaths

Béland, Louis-Philippe; Brodeur, Abel; Wright, Taylor (2020a), *The Short Term Economic Consequences of COVID-19: Exposure to Disease, Remote Work and Government Response*, GLO Discussion Paper, No. 524, Global Labor Organization (GLO), Essen.

Beland, Louis-Philippe; Brodeur, Abel; Mikola, Derek; Wright, Taylor (2020b), *The short-term Economic Consequences of COVID-19: Occupation Tasks and Mental Health in Canada*, GLO Discussion Paper, No. 542, Global Labor Organization (GLO), Essen.

Bosman, Julie (2020), Domestic Violence Calls Mount as Restrictions Linger: 'No One Can Leave'. New York Times, 15 May 2020, accessed 6 July 2020, https://www.nytimes.com/2020/05/15/us/domestic-violence-coronavirus.html?referringSource=articleShare

Chrysanthos, Natassia (2020), Students fear lost semester of learning as universities plan for campus return. Sydney Morning Herald, 7 June 2020, accessed 6 July 2020, https://www.smh.com.au/national/nsw/students-fear-lost-semester-of-learning-as-universities-plan-for-campus-return-20200605-p54zw5.html

Cohen, Joshua (2020), COVID-19 Crowding Out Non-COVID-19 Healthcare And Drug Development. Forbes, 6 May 2020, accessed 6 July 2020, https://www.forbes.com/sites/joshuacohen/2020/05/06/covid-19-crowding-out-non-covid-19-healthcare-and-drug-development/#5f1e7813736a

Cormack, Lucy (2020), Domestic violence victims seeking help rises 10 per cent after COVID-19 lockdown. Sydney Morning Herald, 1 May 2020, accessed 6 July 2020, https://www.smh.com.au/national/nsw/domestic-violence-victims-seeking-help-rises-10-per-cent-after-covid-19-lockdown-20200501-p54oxt.html

Frijters, P., and Foster, G. (2013), *An economic theory of greed, love, groups, and networks*. Cambridge University Press.

Gurda, John (2020), The coronavirus pandemic, collapsing economy and civil unrest are frightening. Wisconsin has seen worse and recovered. *Milwaukee Journal Sentinel*, 4 June 2020, accessed 9 July 2020, https://www.jsonline.com/story/news/solutions/2020/06/04/coronavirus-civil-unrest-frightening-wisconsin-has-seen-worse/5312559002/

Harvey, Fiona (2020), Coronavirus pandemic 'will cause famine of biblical proportions'. *The Guardian*, 21 April 2020, accessed 9 July 2020, https://www.theguardian.com/global-development/2020/apr/21/coronavirus-pandemic-will-cause-famine-of-biblical-proportions

Husain, Arif (2020), After the Pandemic, a Global Hunger Crisis. *New York Times*, 12 June 2020, accessed 9 July 2020, https://www.nytimes.com/2020/06/12/opinion/coronavirus-global-hunger.html

McCauley, Dana; Bagshaw, Eryk; Harris, Rob (2020), Australia prepares for 50,000 to 150,000 coronavirus deaths. Sydney Morning Herald, 16 March 2020, accessed 6 July 2020, https://www.smh.com.au/politics/federal/australia-prepares-for-50-000-to-150-000-coronavirus-deaths-20200316-p54amn.html

OECD (2017), Health at a Glance 2017: OECD Indicators, OECD Publishing, Paris. http://dx.doi.org/10.1787/health_glance-2017-en

Pan, Deanna (2020), 'Strokes and heart attacks don't take a vacation.' So why have emergency department visits sharply declined? *Boston Globe*, 23 April 2020, accessed 6 July 2020, https://www.bostonglobe.com/2020/04/23/nation/strokes-heart-attacks-dont-take-vacation-so-why-have-emergency-department-visits-sharply-declined/

Psacharopoulos, George; Collis, Victoria; Patrinos, Harry Anthony; Vegas, Emiliana (2020), Lost Wages: *The COVID-19 Cost of School Closures*, GLO Discussion Paper, No. 548, Global Labor Organization (GLO), Essen. https://www.econstor.eu/bitstream/10419/217486/1/GLO-DP-0548.pdf

Scott, Sophie (2020), Experts worried people delaying medical tests due to coronavirus will create 'tidal wave' of diagnoses. *ABC News*, 14 May 2020, accessed 6 July 2020, https://www.abc.net.au/news/2020-05-14/coronavirus-medical-testing-delays-could-lead-to-future-sickness/12241812

Sonnemann, Julie, and Goss, Peter (2020), COVID catch-up: *Helping disadvantaged students close the equity gap*, Grattan Institute. https://grattan.edu.au/wp-content/uploads/2020/06/COVID-Catch-up-Grattan-School-Education-Report.pdf

Statista (2020), Coronavirus (COVID-19) deaths worldwide per one million population as of July 1, 2020, by country. Accessed on 6 July 2020, https://www.statista.com/statistics/1104709/coronavirus-deaths-worldwide-per-million-inhabitants/

Taub, Amanda, and Bradley, Jane (2020), As Domestic Abuse Rises, U.K. Failings Leave Victims in Peril. New York Times, 2 July 2020, accessed 6 July 2020, https://www.nytimes.com/interactive/2020/07/02/world/europe/uk-coronavirus-domestic-abuse.html?searchResultPosition=3

Measuring the impacts of COVID-19 on job postings in Australia using a reweighting-estimation-transformation approach

Kailing Shen Australian National University
Bledi Taska Burning Glass Technologies

Abstract

We propose a reweighting-estimation-transformation (RWET) approach to estimate the impacts of COVID-19 on job postings in Australia. Contrary to the commonly used aggregation-based method on counting data, our approach can be used in a relatively 'thin' market, such as Australia. In a thin market, the number of job postings is relatively small, and the share of empty cells increases substantially when aggregating the data into finer categories. Using Australian job postings collected by Burning Glass Technologies and the RWET approach, our empirical evidence shows that the overall labour demand in Australia as of July 2020 is slowly recovering from its lowest 45 per cent dip at the beginning of May. Our results also suggest that the impacts of the pandemic are relatively evenly distributed across skill levels, but vary substantially across states, industries and occupations. Our findings of the dynamics on the demand side of the labour market suggest that skill-targeted policies might not be as effective as policies targeted at the state and industry levels to facilitate economic recovery.

JEL Codes: J21, J63, C55
Keywords: Job Posting; COVID-19; Thin Market

Corresponding author: Kailing Shen, kailing.shen@anu.edu.au
We would like to thank Mikal Skuterud for sharing the sample size data of the Canadian Labour Force Survey. We also thank the editors for providing very helpful comments. The online appendix can be accessed at https://github.com/Discovery666/BGANZ_Paper

1. Introduction

Many countries have been abruptly shaken by COVID-19 in 2020. Although in most cases, lives and health are considered top priorities, it remains essential to monitor the economy. Robust and prompt information of the economy is critical for policymakers, who might consider the optimal approach to support sections affected the most or to facilitate recovery post-pandemic. Job postings data can be particularly useful in such a context.

We compare job postings and other forms of data in detail later. Briefly, compared with survey or administrative data, job postings data have several advantages. These data are a rapid, cheap and precise reflection of the demand side of the labour market. In other words, they are collected nearly real-time at minimum cost and with little misreporting, and thus can facilitate quick and solid policymaking.

These features of job postings data can be especially important in a pandemic. Economic downturn due to a pandemic is such a rare event, and there is little ex ante understanding of it. Policies that have been proved effective in the past, such as in the Global Financial Crisis (GFC), might not be appropriate in the present situation. With near-real-time, high-frequency data on the labour market, policies can be tailor-made and adjusted quickly.

It can be challenging to analyse job postings data in high frequency for a small economy such as Australia. If we follow the commonly adopted method by aggregating the data into cells, more and more cells will be empty for small economies as the level of granularity of these cells becomes higher and higher. There simply are not many job postings for a 'thin' market. This limits the depth of the analysis.

Therefore, we propose a reweighting-estimation-transformation (RWET) approach that overcomes the small sample size problem. Our approach makes it possible to compare the size and composition of two comparable datasets, such as for two time periods and/or two geographic regions. The key idea here is to construct a weighting variable to 'rebalance' the two datasets. Once the datasets are reweighted, we can then use a linear probability model to examine the differences between the two. For ease of interpretation, the delta method can then be used to transform the estimated coefficients into the predicted size and composition differences.

It is worth noting, different from the aggregation-based counting data approach, that the RWET approach only compares two datasets/periods at a time. However, because the RWET approach operates at the micro-level, the identification of the model uses all observations at once. This is different from the aggregation-based approach on counting data, which effectively are censored at zero for empty cells. In particular, the small sample size will not cause data censoring when RWET is applied; rather, it leads to vaguely identified coefficients, which is merely a reflection of the lack of information contained in the data as in any other regression model.

Besides methodological contributions, we provide an empirical analysis of the impacts of the pandemic on the labour demand in Australia by using the RWET approach. The data used here are provided by Burning Glass Technologies (BGT), a Boston-based company that has been collecting and analysing job postings data worldwide since 2007.

Our empirical evidence shows that the overall labour demand in Australia as of July 2020 is slowly recovering from its lowest 45 per cent dip at the beginning of May. Our results also suggest that the impacts of COVID-19 are relatively even across different skill levels. Such similarity also applies across job postings according to various experience levels. These results are robust whether or not we control for composition changes. Further, they differ notably from the patterns of past economic recessions, where workers with more education and experience were affected less (e.g., Rosen 1968; Clark and Summers 1981; Jaimovich and Siu 2009; and Hoynes, Miller and Schaller 2012).

Finally, our empirical evidence shows that COVID-19's impacts on the labour market vary substantially across states, industries and occupations. The two largest states of Australia, New South Wales and Victoria, have both suffered significantly in terms of job postings but in July, 2020 all other states and territories were recovering consistently. As an example of cross-industry variations, in July 2020 the job postings for the health care and social assistance industry actually increased 15 per cent relative to the 2019 level, while those for the accommodation and food services industry were still 29 per cent less than the 2019 level. Across broad occupation categories, sales workers and clerical and administrative workers have been most affected, while labourers and machinery operators and drivers have been least affected. In July, the job postings for both labourers and machinery operators and drivers have even increased by 26 per cent and 35 per cent relative to the 2019 level, respectively.

These patterns are largely intuitive as they match the lockdown policies. However, they do suggest that the nature of the economic recession is of a very different nature from any past recessions. It is not the least skilled workers that are disproportionately affected. As the RWET approach used here allows us to control for composition changes in job postings, these patterns are identified with minimal confounding effects (e.g., variations in education or experience requirements across industries or occupations).

The rest of this paper is organised as follows: section 2 provides a literature review; section 3 discusses the job posting data used here; section 4 explains the RWET approach; section 5 discusses the empirical findings, and section 6 concludes with further discussions.

2. The literature on recessions and the labour market

There has been a long history of studies on the differential impacts of economic recessions on workers of different demographic characteristics. In general, less educated, less experienced, young and unskilled workers are found to be affected most during recessions.

For example, Rosen (1968) shows that skilled workers in the railroad industry experience less employment cyclical variation than unskilled workers. Clark and Summers (1981) suggest that economic recessions affect young workers disproportionately more than others. More recently, Jaimovich and Siu (2009) find that for all G7 countries, there is an empirical regularity between the individual's age and the cyclicality of their employment and hours worked. In particular, prime-age

workers have the most acyclical employment, while teenagers and individuals over 60 have more procyclical employment. Similarly, using the Current Population Survey microdata, Hoynes, Miller and Schaller (2012) show that since 1979, the employment and unemployment cyclicality differences across gender, race, age and education have been 'remarkably stable'. In particular, male, black and Hispanic, youth and low-educated workers were affected much more than others during recessions.

Different from the above studies, Kahn, Lange and Wiczer (2020) examine the impact of COVID-19 on the job postings and initial UI claims in the United States. They find that job postings are affected significantly regardless of whether the industries or occupations have the work-from-home capability. Kahn, Lange and Wiczer (2020) suggest that the impact of COVID-19 on labour demand is similar on jobs that can be performed remotely and those that cannot. If we consider jobs that can be performed remotely to be high-skill jobs, then their results suggest that perhaps the impact of COVID-19 on labour demand is not mainly on unskilled jobs. Conversely, Bai *et al*. (2020) found that firms with more capability to work-from-home showed more resilience in the pandemic than did firms with lower capability. More recently, Chetty *et al*. (2020) argue that their empirical study using various real-time data suggests that traditional macroeconomic tools might not be effective with constrained demand due to pandemic health concerns.

In summary, the economic downturn in 2020 may be of a different nature compared with past recessions.

3. Job postings data: Burning Glass Technologies ANZ Job Feed

The dataset used in this study is created by BGT and is formally known as the NOVA™ ANZ Job Feed, referred to as BGT-ANZ hereafter. The data cover from 1 January 2012 to 31 July 2020. BGT collect job postings data from a broad range of sources in Australia in real-time.

Broadly, job postings data differ significantly from more traditional data sources, such as survey data and administrative data. Most survey data have months or years of time lags due to questionnaire design/data collection/data processing. Further, current evidence suggests that the respondents might find it difficult or be reluctant to respond to surveys during lockdowns. For example, online appendix Figure A1 and Figure A2 show the monthly sample size of the Current Population Survey of the United States and the Labour Force Survey of Canada. Both figures show a dramatic drop in sample size since the pandemic started.

Most administrative data can be timely and cost-effective. However, they capture outcomes rather than intentions. Because of legal reasons, administrative data often only have minimal information about individuals' demographic information, such as age, gender and education, whereas such information could be important for us to understand the causes of people's behaviour. Different from administrative data, job postings data are rich in information and provide the true intention of employers. There is little incentive for employers to misreport, and the data reflect employers' expectations of future product market demand.

Job postings data do come with their own limitations, mostly data quality and representativeness. Raw job postings data need to be processed and deduplicated for analytical usage. Such data quality issues apply to most internet-generated big data in general. For example, BGT takes comprehensive steps to remove duplicate postings, scams (e.g., pyramid schemes) and international jobs (e.g., for nurses to move to the United Kingdom). It is common for duplicates to occur both within and across different sources, with job boards showing the highest rate of duplicates. BGT has also found cases of recruiters posting a job multiple times with different regions listed to increase views, and this is particularly prevalent with international jobs. BGT's algorithms to identify these and other issues results in the removal of more than half of the postings on average.

Korbel (2018) shows that the BGT-ANZ data are largely representative in Australia. For instance, the National Skills Commission of the Australian Government produces its Internet Vacancy Index (IVI) based on SEEK, CareerOne and Australian JobSearch. In 2018, the IVI suggests a figure of 2,187,223 job postings, while BGT-ANZ covers more than 2,200,000 for the same period. Therefore, BGT-ANZ provides a robust representative dataset for the labour demand in Australia.

The representativeness of job postings data could be an issue more specific for economic research. In particular, job postings data only reflect a selected sample of the total vacancies. Employers always have multiple channels, such as social networks, to communicate their job vacancy information to the other side of the labour market. These channels differ in terms of various factors, such as cost, time efficiency and communication effectiveness. There have been substantial shifts in employers' choices in recent decades, and we might continue to observe such changes in the coming years as technology evolves. For the purpose of this study, there is sufficient understanding of how such selection might affect the usage of such data as a measure of labour demand.

Finally, job postings data are an expression of employers' intention to hire; it is beyond such data as to whether and what kinds of worker–employer matches are made. In April 2020, the Australian Bureau of Statistics announced that it will release weekly statistics based on employers' reported data through the Australian Taxation Office Single Touch Payroll system. This type of data describes the stock of the employed population. Job postings data are considered more informative for a better understanding of the employers' demand for new hires. In short, the BGT-ANZ data have unique advantages for us to examine the dynamics of the labour demand in this unprecedented period.

The full BGT-ANZ dataset has several components; besides the main data, it contains detailed information on skill requirements, degree requirements, etc. For the purpose of this study, we shall only use the main data. However, the application of our RWET approach to more detailed categories is relatively straightforward.

Table 1: Characteristics of Job Postings in Australia, 2012–2020

	2012–2014	*2015–2017*	*2018*	*2019*	*2020*
# calendar days	1,096	1,096	365	365	213
# job postings/day	2,116	2,561	2,718	2,857	2,230
# job postings	2,319,063	2,806,711	992,058	1,042,685	475,016
Education requirement					
If valid					
10–12	1.1%	1.2%	1.4%	1.6%	1.5%
13–14	11.1%	10.9%	11.3%	10.2%	10.8%
15	16.9%	17.9%	17.0%	17.5%	18.2%
16	54.8%	54.7%	54.4%	54.5%	52.2%
17	12.1%	10.6%	11.1%	10.5%	10.4%
18	2.6%	3.2%	3.2%	4.2%	5.3%
21	1.3%	1.6%	1.5%	1.4%	1.6%
Missing	76.8%	74.7%	73.8%	76.7%	76.9%
Experience requirement					
If valid					
1	14.6%	15.4%	14.7%	14.1%	14.2%
2	20.4%	22.3%	22.5%	21.5%	21.3%
3	20.2%	20.9%	20.9%	21.3%	20.4%
4–5	28.8%	27.9%	28.2%	29.0%	29.1%
6–8	8.0%	7.1%	7.3%	7.3%	7.5%
9–10	6.0%	5.0%	4.9%	5.2%	5.8%
11–15	1.9%	1.4%	1.4%	1.6%	1.7%
Missing	80.8%	80.3%	80.9%	83.4%	83.6%
Minimum annual wage offered					
If valid					
Less than 50K	17.9%	12.2%	7.6%	8.0%	6.3%
50k–70K	27.4%	30.8%	29.9%	28.1%	28.4%
70k–90K	20.4%	21.6%	21.6%	21.9%	23.0%
90K–110K	13.8%	15.5%	17.8%	16.2%	18.0%
110K–130K	9.2%	9.0%	11.6%	13.1%	11.9%
130K–150K	4.3%	4.1%	4.7%	4.4%	5.2%
150K–200K	7.0%	6.9%	6.8%	8.3%	7.3%
Missing	73.0%	75.5%	75.6%	73.9%	75.0%
State					
New South Wales	37.6%	39.7%	39.3%	38.4%	34.7%
Victoria	22.4%	23.5%	26.1%	24.6%	22.1%
Queensland	17.6%	17.4%	16.9%	16.4%	19.6%
Western Australia	11.6%	7.4%	6.5%	7.9%	9.5%
South Australia	4.0%	4.6%	4.1%	4.5%	4.5%
Australian Capital Territory	3.9%	4.4%	4.3%	5.0%	5.9%
Northern Territory	1.9%	1.6%	1.5%	1.7%	1.8%
Tasmania	1.1%	1.3%	1.2%	1.5%	1.7%
Industry					
Health care and social assistance	15.7%	17.7%	17.9%	18.6%	21.2%
Public administration and safety	13.3%	17.5%	16.4%	15.7%	17.8%
Mining	10.7%	4.0%	6.0%	4.7%	5.3%
Professional, scientific and technical services	9.9%	10.0%	9.7%	10.6%	9.9%
Accommodation and food services	8.2%	7.6%	6.5%	7.2%	6.0%
Financial and insurance services	7.8%	7.0%	6.2%	7.0%	6.9%
Education and training	6.5%	7.9%	10.3%	10.7%	9.4%
Retail trade	6.4%	7.8%	6.8%	6.6%	6.3%
Manufacturing	3.9%	3.6%	3.2%	3.4%	3.5%
Construction	3.2%	2.2%	1.9%	1.6%	1.9%
Rental, hiring and real estate services	2.3%	2.6%	1.9%	2.0%	1.9%
Information media and telecommunications	2.3%	2.6%	2.3%	2.4%	2.3%
Transport, postal and warehousing	2.0%	1.3%	3.0%	2.4%	1.2%
Electricity, gas, water and waste services	1.8%	1.2%	1.2%	1.3%	1.2%
Wholesale trade	1.7%	1.7%	1.6%	1.5%	1.2%
Arts and recreation services	1.5%	2.1%	1.9%	1.4%	1.2%
Other services	1.4%	1.6%	1.9%	1.6%	1.6%
Administrative and support services	1.2%	1.2%	0.9%	1.1%	1.0%
Agriculture, forestry and fishing	0.2%	0.2%	0.2%	0.2%	0.3%
Missing	58.6%	53.4%	48.8%	46.9%	48.3%
Occupation					
Professionals	37.1%	37.5%	39.4%	40.8%	40.7%
Clerical and administrative workers	15.1%	15.5%	14.4%	14.1%	13.2%
Managers	14.8%	14.3%	13.9%	15.5%	15.1%
Technicians and trades workers	12.0%	10.5%	11.5%	9.8%	10.0%
Sales workers	9.3%	9.6%	7.8%	7.8%	7.0%
Community and personal service workers	4.7%	5.1%	4.8%	4.9%	5.2%
Labourers	3.9%	4.4%	4.3%	3.9%	4.8%
Machinery operators and drivers	3.2%	3.2%	3.9%	3.3%	4.2%
Missing	13.4%	15.4%	16.2%	17.5%	17.2%

Table 1 provides a summary of the BGT-ANZ data used in this study. As the table shows, average number of job postings per day increased from 2012 up to 2019, and then dropped significantly in 2020. Among job postings with various education requirements, those requiring 16 years of education dropped the most, and among job postings with various experience requirements, those requiring 3 years of experience dropped the most. Overall, the patterns in Table 1 do not suggest that COVID-19 affects less skilled jobs more.

4. Aggregation-based approach versus reweighting-estimation-transformation approach

4.1 Aggregation-based approach

Before analysis, we aggregate our job postings into date- and covariate-specific cells. The number of postings in each cell can then be used as a measure of labour demand. This is an aggregation-based approach.

4.1.1 Overall impact of COVID-19 on the number of postings

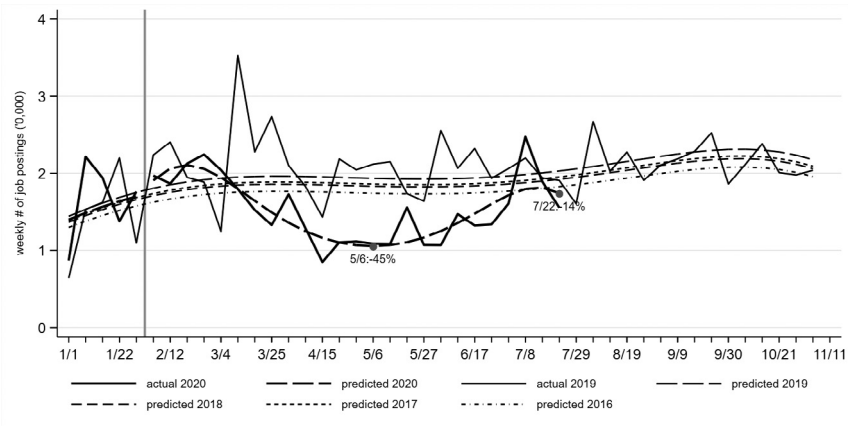
To examine the impacts of COVID-19 on the number of job postings at the aggregate level, we group all the job postings by posting date. In particular, let $n_{w,y}$ be the number of job postings for week w of year y; we then estimate the impacts of COVID-19 at the aggregate level as follows:

$$ln(n_{w,y}) = \alpha_0 + \sum_{s=1,\dots,5}(\alpha_s w^s) + \sum_{t=1,\dots,5}\beta_t \cdot 1(y \equiv 2020) \cdot 1(w \geq 6) \cdot (w-6)^s + \gamma_y + \mu_{w,y} \quad (1)$$

In other words, our baseline includes both year fixed effects and the common quintic time trend. The impacts of COVID-19 are captured to such a baseline from week six of 2020, the week start from 5 February 2020, also using quintic terms. The number of job postings drops substantially at December of each year. Thus, we only keep the first 45 weeks' data for each year, which correspond to early November.

The predicted weekly number of postings and the raw number of postings for the years 2019 and 2020 are presented in Figure 1. As the figure shows, there is a general increasing trend of job postings from January forward, which is common for each year. The impact of COVID-19 started in early March of 2020 in Australia. The number of job postings dropped consistently from March to the beginning of May, when the impact reached its highest level of 45 per cent. From May 2020, the number of postings actually increased slowly and steadily. In the last whole week of our study period, the period from 22 July to 28 July, the impact of COVID-19 on the number of job postings in Australia is estimated to be -14 per cent.

Figure 1: Number of Job Postings in Australia, 2016–2020



Note: The GBT-ANZ job postings data from 2012 to 28 July 2020 are used for the estimation of the model as specified in equation (1). The last week of July is dropped here as it only contains 3 days.

It is worth noting that although our data do not cover the total job postings in Australia, the estimation of the impact of COVID-19 here would only be biased if the selection of job postings into the GBT-ANZ changes over time. For example, if during COVID-19, conditional on having job vacancies, fewer employers choose to publish their job openings in one of the many sources used by BGT, perhaps as they can easily find someone through the social network, then our estimation will be biased down. In that scenario, the actual impact of COVID-19 would be less severe than estimated here. In contrast, if during COVID-19, conditional on having job vacancies, more employers choose to publish their job openings in our sources, perhaps as they would like to take advantage of the larger and more productive pool of potential applicants, then the actual impact of COVID-19 would be more severe than our estimation.

4.1.2 Overall impact of COVID-19 with skill composition controlled

The overall impact of COVID-19 estimated in section 4.1.1 could be biased if as the result of COVID-19 there are more job postings with lower education and experience requirements. That is, even though the total number of postings might not have dropped much, the composition of the job postings in terms of education and experience requirements might have shifted towards the lower end of the distribution. In this case, our estimation of the impact of COVID-19 on the labour demand could be biased up without controlling for education and experience requirements.

Therefore, to incorporate the composition shifts in our analysis, we group the job postings by week of the year, education requirement and experience requirement. Let $n_{w,y,d,p}$ be the number of job postings for week w of year y, of education requirement d and experience requirement p; we can then estimate the impacts of

COVID-19 as follows:

$$Y_{w,y,d,p} = \alpha_0 + \sum_{s=1,\ldots,5}(\alpha_s w^s) + \sum_{m=2,\ldots,6}\delta_m \cdot 1(y \equiv 2020) \cdot 1(month\ of\ week\ w \geq m) + \gamma_y + a_d + b_p + \mu_{w,y,d,p} \quad (2)$$

For ease of presentation, we choose to estimate the changes in job postings in monthly frequency here. In particular, δ_m captures the changes in $Y_{w,y,d,p}$ for February, March, April, May, June and July 2020 from the previous month. These monthly coefficients are the effects of COVID-19 while holding the composition of education and experience constant. The year, education and experience fixed effects are captured by γ_y, a_d and b_p, respectively.

Panel A of Table 2 illustrates the extent of empty cells in our data. When the 7,635,533 job postings are grouped into week x 8 education categories x 8 experience categories cells, there are 100 (1 - 21,195/25,024) = 15.3 per cent cells empty. Four different specifications are compared in panel A. The raw number of postings is used in columns (1) and (2), while the log form is used in columns (3) and (4).

Given a substantial share of the cells are empty, columns (2) and (4) use a Tobit model, while columns (1) and (3) use ordinary least squares with observations of empty cells excluded. As a comparison between columns (1) and (2), or columns (3) and (4), suggests, the results are sensitive to the presence of empty cells, even when we only have two sets of covariates, education and experience. Further, panel A illustrates that the results from the log form are easier to interpret.

Panel B of Table 2 examines the impacts of COVID-19 on the number of postings when we take education and experience requirements into consideration. Among the four columns, column (8) is our preferred specification. It suggests that the number of postings dropped 40.6 per cent in April relative to March and increased 29.5 per cent in July relative to June, and that other month-to-month changes in 2020 are not statistically significant once education and experience are controlled. If we compare the estimated coefficients of April across the columns of panel B, it is interesting that the estimated coefficients decrease from -40.6 per cent to -47.3 per cent, or the estimated coefficient is biased down when education and experience controls are omitted. Based on the omitted variable bias formula, this negative sign of the bias suggests that the drop in job postings is more pronounced for the levels of education and experience with more postings originally. In other words, as panel A suggests, job postings for the 16-year education group and 4–5 years of experience are most affected by COVID-19. Conversely, the estimated coefficients of July increase from 29.5 per cent to 36.1 per cent when education and experience controls are omitted. This positive sign of the bias suggests that the increase in job postings is more pronounced for the levels of education and experience with more postings originally.

Table 2: Impacts of COVID-19 on the Number of Job Postings, using Aggregate-Counting Approach

	A. without COVID-19 controls			
	(1)	*(2)*	*(3)*	*(4)*
Dep variable:	*# of posting of education*experience*date cells*		*# of posting of education*experience*date cells (ln)*	
Approach	OLS	Tobit	OLS	Tobit
Education requirement (default group 10-12)				
13–14	249.4***	655.3***	1.079***	1.843***
15	298.9***	740.7***	1.395***	2.234***
16	506.5***	994.5***	2.721***	3.677***
17	277.9***	760***	1.308***	2.25***
18	195.2***	555***	.519***	1.19***
21	-14.79	-51.61	.0385**	-.0718***
Missing	1855***	2343***	3.677***	4.634***
Experience requirement (default group 1)				
2	43.23	79.91**	.2771***	.3503***
3	44.26	93.86***	.2802***	.3846***
4–5	75.98**	122.8***	.5053***	.5943***
6–8	-82.07**	-175.2***	-.3699***	-.5253***
9–10	-108.6***	-227.2***	-.5415***	-.7189***
11–15	-218.2***	-518***	-1.173***	-1.624***
Missing	1740***	1868***	2.61***	2.912***
# of observations	21,195	25,024	21,195	25,024
R^2	0.283	0.028	0.895	0.439
	B. with COVID-19 controls			
	(5)	*(6)*	*(7)*	*(48*
Dep variable:	*# of posting of education*experience*date cells (ln)*			
Approach	Tobit			
2020 Feb and afterwards	.1612	.1509	.1524	.1481***
2020 March vs. Feb	-.0582	-.0422	-.0497	-.0489
2020 April vs. March	-.4727**	-.4393**	-.4289***	-.4063***
2020 May vs. April	-.0693	-.0717	-.0681	-.0643
2020 June vs. May	.0896	.0540	.0509	.0480
2020 July vs. June	.3611*	.312	.3052**	.2946***
Year F.E. and weekly quintic controls		Y	Y	Y
Education requirement			Y	Y
Experience requirement				Y
# of observations	25,024	25,024	25,024	25,024
R^2	0.000	0.000	0.167	0.440

Note: *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

Let the set of properties for job postings, $i \in I$, be x_i. For our BGT-ANZ data, x_i contains posting date $(jdate_i)$, education requirement (edu_i), experience requirement (exp_i), wage offered $(wage_i)$, state of the job vacancy $(state_i)$, industry of the employer (ind_i), occupation (occ_i), etc. The problem of empty cells will only worsen if we want to consider all of these properties. Thus, we propose an RWET approach instead.

4.2 Reweighting-estimation-transformation approach

There are three steps in our RWET approach proposed here.

4.2.1 Step 1. Construction of weight variable, w_i

Let D_0 be the number of calendar days covered in the benchmark dataset of job postings. Let D_1 be the number of calendar days covered in the investigation dataset of job postings. In our case, we use BGT-ANZ data for the year 2019 as the benchmark dataset. Thus, D_0 is 365. Without loss of generality, we can use BGT-ANZ data for March 2020 as the investigation dataset. Thus, D_1 is 31.

Then, we can pool the benchmark dataset with the investigation dataset to examine the changes in the job postings when the composition is held constant. Because these two datasets cover a different number of days, we need to construct a weight variable to make them comparable. In particular, the weight for job posting i, w_i, is:

$$w_i = \begin{cases} 1 & \text{if } i \in \text{investigation dataset} \\ D_1/D_0 & \text{if } i \in \text{ benchmark dataset} \end{cases}$$

In our example, the weight variable for job postings in our benchmark dataset will be $31/365 \approx 0.0849$.

If these two datasets have exactly the same number of job postings per day and the same composition of job postings, then, after weight is considered, any observation of the combined dataset will have exactly 50 per cent likelihood to come from either 2019 or March 2020. If the compositions of these two datasets are exactly the same while the 2019 dataset has more job postings per day than the March 2020 dataset, then, after weight is considered, the probability of a random observation of the combined dataset to come from 2019 will be higher than 50 per cent, and vice versa. This is the intuition of our strategy here.

4.2.2 Step 2. Regression with the constructed weight variable

Here, we can use a linear probability model on the combined dataset with weight considered and the dummy for March 2020, the investigation dataset, as our dependent variable. By using a linear probability model rather than Probit or Logit, we can consider fixed effects if required:

$$y_i = \beta_0 + \alpha \cdot X_i + \mu_i$$

In this study, X_i includes dummies for education requirement categories, experience requirement categories, minimum wage offered categories, job location states, employer industries and occupations.

4.2.3 Step 3. Transformation

For ease of interpretation, we can use the estimation results to predict the likelihood of any job postings to come from March 2020. Let the covariate of a job posting be X, then $\widehat{y(X)} = \widehat{\beta_0} + \hat{\alpha} \cdot X$ is the likelihood of this job posting coming from March 2020 rather than from 2019. The likelihood of this same job posting coming from 2019 is $1 - \widehat{y(X)}$.

Define $\widehat{d(X)} \equiv \frac{\widehat{y(X)} - (1 - \widehat{y(X)})}{(1 - \widehat{y(X)})} = \frac{\widehat{y(X)}}{1 - \widehat{y(X)}} - 1$. This is the change of this job posting's likelihood to come from 2019 versus March 2020. If we set X at the mean of 2019, then $\widehat{d(X)}$ gives the change of the likelihood of a typical job posting in 2019 to appear in March 2020.

The standard error can be calculated using the delta method. In particular:

$$var\left(\widehat{d(X)}\right) = \left[\frac{1}{1 - \widehat{y(X)}} + \frac{\widehat{y(X)}}{\left(1 - \widehat{y(X)}\right)^2}\right] \cdot var\left(\widehat{y(X)}\right) \cdot \left[\frac{1}{1 - \widehat{y(X)}} + \frac{\widehat{y(X)}}{\left(1 - \widehat{y(X)}\right)^2}\right]$$

Obviously, there is no empty cell problem in our RWET approach. Further, it is straightforward to estimate the change of any specific job postings. For example, by keeping all other covariates at their 2019 mean, we can set the education requirement of the hypothetic job postings to 10–12 years. Using the estimation results of March 2020 versus the year of 2019, we can then obtain, for this specific education level, the composition-adjusted percentage change of the number of job postings.

5. Main findings

The empirical results based on our RWET approach are presented in Table 3 and Figures 2–3 and Figure A4 of the online appendix.

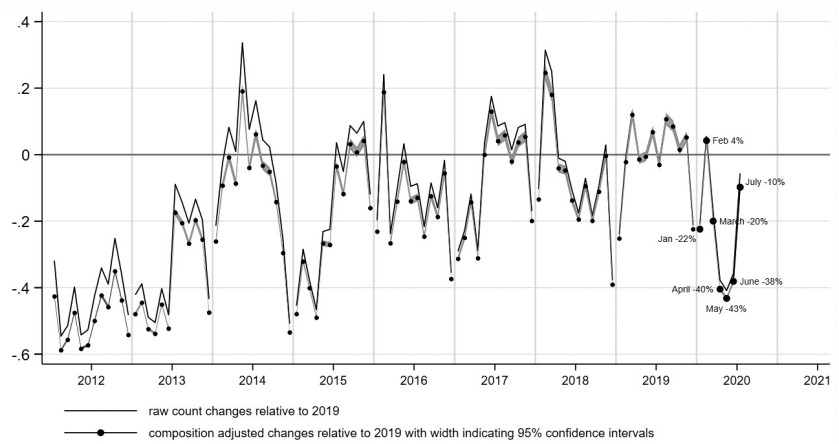
For each month from January 2012 to July 2020, we run a separate RWET process. Then, we present the estimated percentage change of job postings numbers for a typical 2019 job at these months. Such composition-adjusted estimations of job postings numbers, as well as 95 per cent confidence intervals, are shown in Figure 2.

As the figure shows, the composition-adjusted estimates are very similar to the raw job postings count changes. The differences between the two curves are larger for earlier years, perhaps because of the gradual change in the composition of the job postings over time.

Figure 2 also shows that the drop in job postings is quite significant in March and April 2020. By July, there has been some significant recovery of the number of job postings, composition-adjusted or not. Further, the composition-adjusted drop is

shown to be slightly higher than the raw data, which implies that the type of jobs that are more representative in 2019 dropped more significantly as a result of the COVID-19 shock.

Figure 2: Percentage Changes of Number of Job Postings Relative to 2019, Jan 2012 to July 2020



Note: The GBT-ANZ job postings data from 2012 to 28 July 2020 are used for the estimation of the model as specified in equation (1). The last week of July is dropped here as it only contains 3 days.

The composition-adjusted change in job postings numbers, together with statistical significance levels, are presented in the first row of Table 3 for the first 7 months of 2020. The rest of Table 3 then presents the composition-adjusted change in job postings numbers for the same months, while keeping all other covariates at the 2019 average. For example, for job postings with an education requirement of 10–12 years, and all other covariates at the 2019 average, the number of job postings dropped by 25.13 per cent in January 2020; increased by 11.94 per cent in February 2020; and dropped by 1.37 per cent, 59.85 per cent, 51.45 per cent, 41.4 per cent and 18.8 per cent in March, April, May, June and July, respectively.

These estimated changes are also illustrated in Figures 3 in the online Appendix. As a comparison, online appendix Figure A3 provides graphs of the raw changes for each month. While the estimated changes are very similar to the raw changes, indicating little changes in the composition of the job postings from their 2019 benchmark set, we do have the advantage of knowing the statistical significance of each of these changes by using RWET, as the 95 per cent confidence intervals are indicated by the solid lines in these estimated bars. As the figures show, many of the small increases are not statistically significant.

Table 3: Impacts of COVID-19 on the Number of Job Postings, using Reweighting-Estimation-Transformation (RWET) Approach

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	January	*February*	*March*	*April*	*May*	*June*	*July*
For typical 2019 job postings	-0.2242***	0.0422***	-0.1999***	-0.4046***	-0.4323***	-0.3811***	-0.0979***
Education requirement							
If valid							
10–12	-0.2513***	0.1194	-0.0137	-0.5985***	-0.5145***	-0.4140***	-0.1811**
13–14	-0.1720***	0.0330	-0.0842**	-0.4367***	-0.4254***	-0.4519***	-0.2348***
15	-0.0690**	0.0995**	-0.0928***	-0.4837***	-0.5104***	-0.3675***	-0.0932***
16	-0.1944***	0.0211	-0.1546***	-0.4487***	-0.4729***	-0.4341***	-0.2106***
17	-0.1261***	0.0542	-0.1744***	-0.4466***	-0.4792***	-0.4448***	-0.1923***
18	0.0031	0.2610**	0.0195	-0.2520***	-0.3091***	-0.2028***	0.1382
21	-0.2383***	0.0335	-0.1778*	-0.0042	-0.2330***	-0.0818	0.5650*
Missing	-0.2433***	0.0398***	-0.2200***	-0.3923***	-0.4214***	-0.3712***	-0.0746***
Experience requirement							
If valid							
1	-0.1650***	0.0690	-0.0599	-0.4531***	-0.5064***	-0.4589***	-0.1918***
2	-0.0959***	0.0979**	-0.0795**	-0.4860***	-0.4481***	-0.4729***	-0.2438***
3	-0.1172***	0.0453	-0.1561***	-0.4701***	-0.4898***	-0.4705***	-0.1764***
4–5	-0.0744***	0.1104***	-0.1647***	-0.4435***	-0.4364***	-0.4257***	-0.1907***
6–8	-0.0778	0.0998	-0.1915***	-0.3212***	-0.4777***	-0.3585***	-0.1286**
9–10	-0.0953	0.2237*	-0.1264**	-0.3522***	-0.3751***	-0.3919***	0.1273
11–15	-0.2198**	-0.0139	-0.1156	-0.3188***	-0.5162***	-0.3416***	0.2823
Missing	-0.2461***	0.0329***	-0.2133***	-0.3963***	-0.4262***	-0.3682***	-0.0817***
Minimum annual wage offered							
If valid							
Less than 50k	-0.3781***	-0.2127***	-0.4339***	-0.6874***	-0.5108***	-0.5554***	-0.3810***
50k–70k	-0.1204***	-0.0031	-0.1504***	-0.4853***	-0.4570***	-0.4753***	-0.2240***
70k–90k	-0.0596**	0.0862**	-0.1199***	-0.5279***	-0.4519***	-0.4496***	-0.2303***
90k–110k	0.1222***	0.2681***	-0.1775***	-0.5017***	-0.4073***	-0.4374***	-0.2701***
110k–130k	-0.1838***	0.0958*	-0.3091***	-0.5884***	-0.4793***	-0.5367***	-0.4179***
130k–150k	0.1250	0.3947***	-0.1203**	-0.4286***	-0.3849***	-0.4353***	-0.2025***
150k–200k	-0.3282***	-0.1037**	-0.2312***	-0.5400***	-0.5223***	-0.5711***	-0.3692***
Missing	-0.2598***	0.0376***	-0.1992***	-0.3544***	-0.4229***	-0.3406***	-0.0214**

Note: *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

Table 3: Impacts of COVID-19 on the Number of Job Postings, using Reweighting-Estimation-Transformation (RWET) Approach (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	January	*February*	*March*	*April*	*May*	*June*	*July*
State							
New South Wales	-0.2913***	-0.0299**	-0.2915***	-0.4111***	-0.4965***	-0.4540***	-0.1535***
Victoria	-0.1729***	0.0498***	-0.2988***	-0.5119***	-0.5266***	-0.4632***	-0.2475***
Queensland	-0.1822***	0.2158***	0.2293***	-0.2987***	-0.2728***	-0.3036***	-0.0189
Western Australia	-0.0803***	0.1390***	-0.1080***	-0.3384***	-0.2430***	-0.2525***	0.3406***
Southern Australia	-0.2499***	-0.0542*	-0.2745***	-0.4101***	-0.4089***	-0.2751***	0.0264
Australian Capital Territory	-0.2282***	0.0798**	-0.1611***	-0.2641***	-0.2339***	-0.0298	0.1137***
Northern Territory	-0.2295***	-0.0716	-0.2563***	-0.3365***	-0.3167***	-0.0476	0.0583
Tasmania	-0.3013***	-0.0784	-0.0743	-0.2477***	-0.3129***	0.0844	0.2190**
Occupation							
Professionals	-0.2261***	0.0366**	-0.2344***	-0.3922***	-0.4375***	-0.3763***	-0.0750***
Clerical and administrative workers	-0.2057***	0.0457*	-0.1723***	-0.4900***	-0.4787***	-0.4475***	-0.2262***
Managers	-0.2181***	0.0610**	-0.2021***	-0.3674***	-0.4510***	-0.3710***	-0.1585***
Technicians and trades workers	-0.2372***	0.0308	-0.1957***	-0.3518***	-0.3995***	-0.3208***	-0.0085
Sales workers	-0.1871***	0.0334	-0.2155***	-0.5320***	-0.5781***	-0.4612***	-0.1592***
Community and personal service workers	-0.1795***	-0.0317	-0.1885***	-0.3916***	-0.2474***	-0.3991***	-0.0923***
Labourers	-0.1857***	0.0961*	-0.0754**	-0.2266***	-0.2431***	-0.2093***	0.2631***
Machinery operators and drivers	-0.2447***	0.1617***	0.0088	-0.3045***	-0.2024***	-0.1915***	0.3590***
Missing	-0.2575***	0.0364*	-0.1978***	-0.4149***	-0.4327***	-0.3979***	-0.1335***

Continued over page

Note: *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 3: Impacts of COVID-19 on the Number of Job Postings, using Reweighting-Estimation-Transformation (RWET) Approach (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	January	*February*	*March*	*April*	*May*	*June*	*July*
Industry							
Health care and social assistance	-0.2266***	-0.0732***	-0.1605***	-0.2676***	-0.2821***	-0.1702***	0.1511***
Public administration and safety	-0.2895***	0.1635***	-0.2263***	-0.3929***	-0.2113***	-0.1591***	0.1178***
Mining	-0.3040***	-0.0354	-0.3452***	-0.3481***	-0.4963***	-0.4394***	-0.2192***
Professional, scientific and technical services	-0.2515***	0.0642*	-0.2252***	-0.4365***	-0.5640***	-0.5518***	-0.2138***
Accommodation and food services	-0.2205***	-0.0992***	-0.4437***	-0.7023***	-0.6268***	-0.4902***	-0.2851***
Financial and insurance services	-0.0886***	0.1415***	-0.1284***	-0.4957***	-0.5114***	-0.4086***	-0.0420
Education and training	-0.3899***	0.1145***	-0.3171***	-0.6564***	-0.4484***	-0.4609***	-0.2338***
Retail trade	-0.0814**	-0.0645*	-0.2118***	-0.4821***	-0.5691***	-0.4890***	-0.1000***
Manufacturing	-0.2497***	0.1484**	-0.2297***	-0.3804***	-0.5407***	-0.4497***	-0.1439***
Construction	-0.1869***	0.1360	-0.0866	-0.4317***	-0.4612***	-0.3782***	-0.0011
Rental, hiring and real estate services	-0.3313***	-0.0728	-0.2053***	-0.4670***	-0.4674***	-0.3322***	0.0173
Information media and telecommunications	-0.0577	0.0718	-0.1895***	-0.4414***	-0.5955***	-0.5156***	-0.2292***
Transport, postal and warehousing	-0.4981***	-0.4256***	-0.6313***	-0.8374***	-0.7447***	-0.6658***	-0.4699***
Electricity, gas, water and waste services	-0.2293***	-0.1983***	-0.2575***	-0.4981***	-0.4615***	-0.5452***	-0.3108***
Wholesale trade	-0.2986***	0.0882	-0.3363***	-0.5593***	-0.6445***	-0.6011***	-0.3236***
Arts and recreation services	0.1707	0.4525**	-0.2294***	-0.8781***	-0.8756***	-0.7106***	-0.5652***
Other services	-0.2811***	0.1025	-0.2039***	-0.5392***	-0.5219***	-0.3887***	-0.0659
Administrative and support services	-0.2349***	0.1394	-0.2271***	-0.7116***	-0.6096***	-0.4674***	-0.4262***
Agriculture, forestry and fishing	-0.1647	0.0442	-0.1345	-0.4693***	-0.4855***	-0.3022***	-0.0499
Missing	-0.1967***	0.0627***	-0.1376***	-0.3060***	-0.3958***	-0.3686***	-0.0903***

Note: *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

Figures A3.1-A3.4 in the online Appendix suggest that the impacts of the pandemic are relatively evenly distributed across skill levels. For example, the impacts are similar in terms of timing and intensity across different education, experience and minimum annual wage categories. The impacts are also similar across temporary and permanent job postings.

Figures A3.5-A3.7 in the online Appendix suggest that the impacts of the pandemic vary substantially across states, industries and occupations. In these three figures, categories are sorted in descending order according to the share of total postings in each category. For example, in Figure A3.5, there are more job postings for New South Wales than for any other state; in Figure A3.6, there are more job postings in the health care and social assistance industry than in any other industry, and in Figure A3.7, there are more job postings for professionals than for any other occupation.

Obviously, we can use much finer categories of geographic regions, industries and occupations. In Figure A4 of the online appendix, we present a set of results for the impacts of COVID-19 across industries within each state. These results are based on estimations for each state. As these graphs show, the impacts also differ across states. For example, arts and recreation services are affected the most in New South Wales, Victoria, Queensland and Western Australia, but not in South Australia and Australian Capital Territory. The results presented here do illustrate broader patterns. In these broader patterns, the results suggest that the impacts of this pandemic vary across regions, industries and occupations.

6. Discussion

This paper proposes a new approach to estimate the changes of job postings that could be used for a relatively thin market. This RWET approach allows the analysis at a higher granularity than the commonly used aggregation-based approach. On the basis of this approach, we examine the impact of COVID-19 on the Australian labour market by using job postings data provided by BGT. The empirical evidence shows that the overall labour demand in Australia as of July 2020 is slowly recovering from its lowest 45 per cent dip at the beginning of May. Our results also suggest that the impacts of the pandemic are relatively evenly distributed across skill levels, but vary substantially across states, industries and occupations.

Australia is a small open economy. The economic development levels across the country are relatively uniform. During a 'normal' economic downturn, one would expect the impacts to be similar across geographic regions and, as discussed, less competitive firms to be affected most. Therefore, more educated, more experienced and highly paid workers would be affected less as they are more likely to be working with more competitive firms. Moreover, as Hershbein and Kahn (2018) note, in the US the firms in the hardest hit regions tended to increase their skill requirements more after the GFC. These patterns, supported by past empirical studies, all justify skill-upgrading types of policies during a 'normal' economic downturn.

However, the economic downturn due to COVID-19 has obviously not been 'normal' from the beginning. Under lockdown measures, competitiveness hardly helps

firms; nor do skills help workers. Therefore, we suggest that appropriate economic policies have to be matched with relaxation of lockdown measures and these have to be gradual to allow firms and workers to recover from the 'coma'. The usual concern of skill-mismatch due to technology upgrading also seems unreasonable as it is unlikely that surviving firms will update their capital investment immediately after COVID-19. Of course, if government policies provide capital-upgrading incentives intentionally, matters may be different. Thus, if employment is the focus of recovery policies, then our findings suggest that skill-targeted policies might not be as effective as policies targeted at the state and industry levels.

This paper sets a prototype of possible research on job postings as a measure of labour market activities. There are more and more near-real-time administrative data on the labour market that could complement job postings data nowadays. Many of these new data could be utilised further using the RWET approach proposed here. In other words, the RWET approach can be used much more broadly than only on job postings data.

The BGT data also have various additional information categories, which could be used to understand the dynamics of labour demand over time. For example, there is detailed information on skills, degrees, subjects and majors. Analysing this information is beyond the scope of this study but could be the focus of future research.

References

Bai, J., Brynjolfsson, E., Wang, J., Steffen, S. and Wan, C. (2020), 'The Future of Work: Work from Home Preparedness and Firm Resilience During the COVID-19 Pandemic'. Retrieved from: https://opportunityinsights.org/wp-content/uploads/2020/05/tracker_paper.pdf

Chetty, R., Friedman, J. N., Hendren, N., Stepner, M. and the Opportunity Insights Team (2020), 'Real-Time Economics: A New Platform to Track the Impacts of COVID-19 on People, Businesses, and Communities Using Private Sector Data'. Retrieved from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3616893

Clark, K. B. and Summers, L. H. (1981), 'Demographic Differences in Cyclical Employment Variation', *Journal of Human Resources*, 16, 61–79.

Hershbein, B. and Kahn, L. B. (2018), 'Do Recessions Accelerate Routine-Biased Technological Change? Evidence from Vacancy Postings', *American Economic Review*, 108, 1737–1772.

Hoynes, H., Miller, D. L. and Schaller, J. (2012), 'Who Suffers During Recessions?', *Journal of Economic Perspectives*, 26(3), 27–48.

Jaimovich, N. and Siu, H. E. (2009), 'The Young, the Old, and the Restless: Demographics and Business Cycle Volatility', *American Economic Review*, 99, 804–826.

Kahn, L. B., Lange, F. and Wiczer, D. G. (2020), *Labor Demand in the Time of COVID-19: Evidence from Vacancy Postings and UI Claims*, National Bureau of Economic Research Working Paper No. 27061.

Korbel, P. (2018), Internet Job Postings: Preliminary Skills Analysis, NCVER Technical Paper. Retrieved from: https://www.ncver.edu.au/research-and-statistics/publications/all-publications/internet-job-postings-preliminary-skills-analysis

Rosen, S. E. (1968), 'Short-Run Employment Variation in Class-I Railroads in the U.S., 1947–1963', *Econometrica*, 36, 511–529.

Scarring effects: A review of Australian and international literature

Jeff Borland Department of Economics, University of Melbourne

Abstract

Scarring occurs when an adverse experience for a worker – associated with macroeconomic conditions - has negative long-term impacts on their labour market outcomes. For example, a worker who is entering the labour market during a macroeconomic downturn may experience a spell of unemployment or have to take a job for which they are over-qualified – and those experiences then affect the worker's labour market outcomes in future years. Recent studies find that scarring effects are substantial: for example, the main Australian study on scarring finds that graduates entering the labour market at a time when the youth rate of unemployment rate is 5 ppts above average lowers annual earnings of graduates by about 8 per cent at the time of entry and by 3.5 per cent after five years. This article reviews Australian and international evidence on scarring; and provides an overview of the main channels through which scarring occurs.

JEL Codes: J23, J30, J60
Keywords: Scarring; unemployment; job quality

Acknowledgement
I am grateful for helpful suggestions from Phil Lewis and a co-Editor. This article uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper are those of the author and should not be attributed to either DSS or the Melbourne Institute.

Research in this article has been funded by ARC Discovery Grant DP160102269.

1. Introduction

COVID-19 has caused a decrease in the demand for labour in Australia at a scale and speed never experienced before. Total hours worked decreased by 9.5 per cent in just one month – from March to April. By comparison, in the major recessions of the 1980s and 1990s total hours worked decreased by 6 per cent – but that was after 18 months.[1] While the gradual removal of health-related restrictions on business activity will bring a bounce-back in employment, it is likely to remain below its pre-COVID-19 level for a prolonged period.[2]

Underlying the immediate effect of COVID-19 on total employment are individual-level impacts. Many workers have lost their jobs and become unemployed or moved out of the labour force. Other workers are still employed only by virtue of JobKeeper. And labour force participants who were already unemployed have almost no chance of finding employment. Obviously, these experiences make those displaced workers and jobseekers worse off today. What is also known is that the experiences will cast a long shadow. For example, having a spell of unemployment today implies worse labour market outcomes in future years.

The link between labour market outcomes today and tomorrow is referred to as scarring: defined to happen when there is a long-term negative impact on a worker due to some adverse labour market experience associated with macroeconomic conditions. The impact of macroeconomic conditions could come:

i] At the time when a young person is seeking to enter the labour market (making a transition from education); or

ii] At a later stage of work career after having already spent time in employment.[3]

Where a macroeconomic downturn (or recession) occurs, this can cause a variety of types of adverse labour market experience at that time. First, new entrants will find it more difficult to find a job; and existing workers face a higher risk of being retrenched. Being unable to find work or losing a job will mean that workers either become unemployed or – where they believe they will not find work – move out of the labour force (known as the discouraged worker effect). Second, it will be more difficult for workers to match to high-quality jobs and jobs where their skills are fully utilised.

The basis of scarring is that these experiences – spending extra time out of employment or accepting a lower-quality job than otherwise – will have negative consequences beyond their immediate impact. That long-term impact could be on labour market outcomes, household income, social outcomes (including family formation) or health and mortality.[4] In this article I focus on labour market outcomes.

---

1 See Borland and Charlton (2020).

2 See for example Borland (2020); Reserve Bank of Australia (2020).

3 Some studies combine both types of approach – by examining impact of individual unemployment experience using local labour market conditions as an instrument – for example, Neumark (2002) and Gregg (2001).

4 For examples of studies of long-term impacts of adverse labour market experiences on health outcomes, see Maclean (2013) and Cutler *et al*. (2015).

For thinking about the labour market impacts of COVID-19 in Australia it is relevant to consider both impacts on young people who will be seeking to enter the labour market and on the workforce who were already in jobs. First, it now seems certain that cohorts of students who are (or would have been) leaving school at the end of 2020 (and perhaps also 2021) will face a considerably more difficult time getting into employment. Second, a much larger proportion of the existing workforce will experience a spell out of employment due to COVID-19 than would have happened otherwise.

Understanding the phenomenon of scarring is of considerable importance for forecasting future impacts of COVID-19 on labour market outcomes in Australia; and for policy-makers in seeking to address those impacts. Most studies for Australia have been on impacts deriving from a spell (or spells) of unemployment. Section 2 provides a review of that literature. Internationally, a decent-sized literature on scarring due to entering the labour market at a time of macroeconomic downturn also exists. Since that literature is likely to offer important insights into prospects for cohorts of students in Australia about to complete their education, it is reviewed in Section 3.[5] Section 4 complements the review of international literature with a summary of the study of scarring for labour market entrants that has been undertaken in Australia. Section 5 provides concluding remarks.

2. Australian evidence on the long-term effects of unemployment

There is an extensive history of research in Australia on the long-term effects of unemployment. However, probably reflecting the Australian experience of low unemployment in recent years, this research was mainly undertaken in the 1980s and 1990s, with just a few studies in the 2000s. This has the consequence that the studies mainly use data from the 1980s to early 2000s.

There are two main approaches taken in this research. First, estimating hazard models for the determinants of exiting unemployment: where the probability of exit is made conditional on past labour market history (such as number of spells of unemployment). Second, estimating panel models of the determinants of current labour force status: where current status can be made conditional on past labour market history.

Early studies mainly used the hazard model approach. In a previous review (Borland 2000) I surveyed studies undertaken prior to 2000. Some evidence comes from these studies that the chances of exiting from unemployment to employment are worse (better) where a jobseeker has a labour market history with more time unemployed (in a job). In a later study, Carroll (2006) estimates a hazard model using calendar data on labour force states for 2001 and 2002 using the HILDA survey. He finds that a jobseeker with a previous experience of unemployment (prior to the current spell) reduces the probability of exiting unemployment by 27 per cent.

5 There is also a large international literature on the second type of scarring – beginning with Heckman and Borjas (1980).

Panel data models were the main approach used to study the determinants of labour force status in the 2000s. Knights *et al*. (2002), Le and Miller (2001), and Buddelmeyer *et al*. (2010) estimate dynamic models for the determinants of current labour force status with alternative sets of variables to proxy for labour market history.[6]

All these studies find evidence of state-dependence: that being unemployed (or the total amount of time spent unemployed) in a time period increases the likelihood of being unemployed in the next time period (where the time periods are usually year-to-year).

Knights *et al*. (2002) use four annual waves of data from the Australian Longitudinal Survey. They find that for high-education workers, being unemployed at a survey date caused a 5.3 per cent increase in the likelihood of being unemployed a year later, with smaller but significant effects for 4 years. For low-education workers the effect in the year after being unemployed was to raise the probability of unemployment by 9 per cent, but after that the effect disappeared.

Buddelmeyer *et al*. (2010) use annual data from the HILDA survey from 2001 to 2007. They find that being unemployed at a survey date increases the likelihood of unemployment at the next survey date for both males and females. Being unemployed for two consecutive survey dates has an even larger negative effect on the probability of employment. There is still scarring, but it is reduced in size for a survey respondent who was unemployed two years ago but then employed one year ago.

The most sophisticated analysis is undertaken by Doiron and Gorgens (2008). They estimate a dynamic event history model using data for 1989-94 from the Australian Longitudinal Youth Survey for young Australians with no post-school education. With this empirical method it is possible, for example, to recover transition intensities which describe patterns of transition between labour force states by elapsed time in the current labour force state.

In examining the scarring effect of unemployment experience, Doiron and Gorgens distinguish between duration dependence (the effect of the length of previous spells of unemployment) and occurrence dependence (the effect of the number of spells of unemployment). They find evidence for the former but not the latter in determining labour market outcomes for young Australians. That is, they find that an extra spell of unemployment raises the probability of being unemployed in the future (by about 15 ppts); but that the duration of those spells does not affect the likelihood of future unemployment.

3. International evidence on starting in the labour market in a macroeconomic downturn

There are two main strands of literature on the impact of macroeconomic conditions at the time of time of beginning one's work-life – studies encompassing all young labour market entrants; and studies that focus on college (university) graduates. Summaries of these studies are in (respectively) Tables 1 and 2.

6 For a related descriptive analysis, see Marks *et al*. (2002).

a) All young labour market entrants

All studies find large negative effects on earnings and employment in the years immediately after entry for workers who join the labour market in a downturn. The studies differ, however, in their estimates of the speeds at which those negative effects fade. Hence, estimates of the total long-run magnitude of scarring vary between studies.

At the high end is the recent study for the United States by Schwandt and van Wachter (2019). They find that an increase in the unemployment rate by 3 ppts at the time of labour market entry reduces total earnings for an average worker by 6 per cent per year for 10 years post-entry. At the low-end are studies, also for the United States, which find effects mainly concentrated in the year of entry to labour market. In between are studies for the United Kingdom and Austria which find an average negative effect on total earnings of about 3-4 per cent per year from an increase in the unemployment rate of 3-4 ppts.

The decrease in total labour market earnings can derive from workers spending less time in employment and/or from lower earnings when employed. Both appear to be important – but the timing of impact differs. The effect of spending time out of employment is concentrated in the initial years after labour market entry. It is caused both by taking longer to find a job at the time of entry; and being less likely to obtain full-time work. The effect on earnings when employed tends to be more prolonged and spread evenly over time. Hence, in the initial years after labour market entry the impact of the decrease in time in employment tends to be the dominant influence on scarring; whereas in later years it is reduced earnings when employed that primarily accounts for scarring.

Most studies find larger scarring effects for entrants with low education than high education – usually by quite a large magnitude. For example, Schwandt and van Wachter (2019) find effects that are four times larger for workers who have not completed high school than for college graduates.[7]

Studies for the United States and United Kingdom have examined how the impact of scarring on labour market earnings translates into household market income. Both find a direct flow-through. However, that does not imply a decrease in consumption or living standards. First, the impact of the decrease in labour market earnings is at least partly offset by operation of the tax/transfer system. Second, in the United Kingdom it is found that for many young people the impact of scarring on income is cushioned by living at home.

7 The exception is two US studies which find for low education workers large negative effects in the year of entry to the labour market that disappear thereafter; compared to more persistent small effects for workers with high education. The authors of both studies (Genda *et al*. 2010; and Speer 2016) suggest that the result may be due to the US market for low-skill labour operating as a spot market. However, another possible explanation is the data source. Both these studies use NLSY79. Whereas other US studies using alternative data sets find inverse relation between education attainment and impact of entering labour market in a downturn.

b) Graduates

All studies of college graduates find negative effects of graduating in a downturn.[8] Within this group, there is also evidence of an ordering of earnings losses by skill level – with larger average earnings losses for college graduates with lower expected earnings.

Most of the studies assess the roles of decreased job quality and worker/job match quality as mechanisms through which scarring occurs. It is found that these mechanisms can explain from one-quarter to one-half of the negative impact on total earnings from graduating in a downturn.

c) Why do downturns cause scarring?

The first explanation is that downturns cause a delayed entry to employment – and that delay has long-term effects on the probability of employment or on earnings when employed. The long-term effect might result from skill atrophy, negative effects on motivation or stigma effects from employers.

The second explanation is that downturns cause a decrease in the quality of first job and/or quality of job match obtained by new entrants. First, a relative shortage of high-quality jobs in a downturn can cause workers (on average) to be forced to shift down the job quality ladder (for example, Oreopoulos *et al*. 2012). Second, workers may need to take jobs to which they are less well matched during a downturn (for example, Liu *et al*. 2016). The incidence of mismatch is likely to be exacerbated where macroeconomic downturns become periods of accelerated structural change in the composition of employment (for example, Fahrer and Heath 1992).

Needing to accept a job that is lower quality or to which a worker is less well matched will cause workers' earnings to be lower than otherwise. This effect can be undone where workers are able to move to better jobs. But since it will take time for this to happen, the initial job quality or match becomes a source of long-term negative effects.

d) Interpreting estimates of scarring effects

The standard empirical method for estimating scarring effects is via a regression model for the association between the rate of unemployment at the time a graduate enters the labour market (usually relating to the geographic region where they reside) and their labour market outcomes in later years. In interpreting estimates of scarring effects it is important to take into account that an above-average rate of unemployment at the time when a graduate enters the labour market is likely to be correlated with above-average rates in later years. That is, estimates of the scarring effect of entering the labour market in a year with an above-average rate of unemployment are in fact capturing the joint impact of the rate of unemployment being elevated at their time of entry and in later years.

8 In addition to the studies reviewed in Table 2, Oyer (2006, 2008) examines the specific experiences of economists and finance professionals.

4. Do we see scarring associated with labour market entry during a macroeconomic downturn in Australia?

This section reviews evidence on scarring associated with entering the labour market during a macroeconomic downturn in Australia. First, I present descriptive evidence on how the employment/population (EMP/POP) rate of young people has varied with macroeconomic conditions at their time of entry to the labour market. Second, I review Andrews *et al*.'s (2020) study of how entry conditions affect long-term labour market outcomes. Both exercises suggest that labour market conditions at the time when young people have been entering the labour market in Australia have an appreciable and persistent impact on their employment outcomes.

The descriptive evidence uses data from the HILDA survey for young people in Australia who left full-time (FT) education from 2005 to 2015 (aged 15 to 24 years at the time they left education). Chart 1a shows the relation between the EMP/POP rate for young people in the first year after they FT education and the unemployment rate at the end of the year in which they left FT education.[9] An inverse relation exists between the rate of unemployment at the time of leaving FT education and a cohort's EMP/POP rate in the first year after leaving education. A simple regression model estimates that a 1 ppt increase in the rate of unemployment is associated with a decrease in the EMP/POP rate by 3.3 ppts (significant at the 1 per cent level).

Looking at the first year after leaving FT education reveals the immediate impact of economic conditions on labour market outcomes of the young. What about longer-run effects? I have also calculated EMP/POP rates two and three years after leaving FT education. After two years a 1ppt increase in the rate of unemployment at the time of leaving FT education is associated with a decrease in the EMP/POP rate of 2.9 ppts. After three years the size of decrease is smaller, 1.8 ppts, although the association still retains a high level of significant (significant at 5 per cent level). Chart 1b displays the relation between the rate of unemployment at the time of leaving FT education and the EMP/POP rate after three years.

The only detailed analysis undertaken thus far of how entry conditions affect long-term labour market outcomes in Australia is by Andrews *et al*. (2020). The study uses Australian Taxation Office data to examine the effect of macroeconomic conditions on annual incomes of individuals who graduated between 1988-89 and 2012-13. Entry conditions are proxied by the youth rate of unemployment by state in the year of graduation. The study finds a large initial impact on annual income, that fades over time. At one and five years after entry, a one per cent increase in the rate of unemployment is associated with respectively annual earnings that are 1.6 per cent and 0.7 per cent lower. By ten years, however, there is no significant effect. The negative impact on annual earnings is shown to derive both from a decrease in the proportion of young people employed and from lower weekly earnings (with both effects being significant for 6 years after graduation). Scarring effects are larger for post-2000 than pre-2000 graduates; for 3-year course graduates than Honours graduates; and for non-G8 university graduates than G-8 graduates.

9 The Data Appendix provides full details of this analysis.

The analysis establishes that one channel through which scarring operates is that young people entering the labour market in a downturn are forced to take lower wage jobs (at lower productivity firms). Their mobility out of those jobs is then initially slower than at other times, a source of scarring. Eventually, however, mobility of young people who graduate during a downturn comes to be faster than other cohorts, which contributes to the fading of scarring. The importance of mobility to undoing scarring – together with the decrease in job mobility in Australia since the mid-2000s - provides a potential explanation for why scarring is found to be more severe for post-2000 graduates.[10]

5. Conclusion

What lessons can be drawn from this review of literature on scarring for the labour market impact of COVID-19 in Australia? A first lesson is that it must be taken seriously. Empirical studies uniformly find evidence of scarring effects associated with having a spell of unemployment and/or entering the labour market during a macroeconomic downturn. A second lesson is about the likely magnitude of scarring effects. The evidence is that the magnitude of scarring depends on both the size and duration of macroeconomic downturn. In this regard, a note of caution about drawing inferences for the current situation in Australia from existing evidence on scarring is necessary. On the one hand, the scale of decrease in employment thus far in the COVID-19 recession would indicate potentially substantial scarring effects. On the other hand, that a large faction of the decrease in employment may be fairly rapidly reversed as health-related restrictions on business activity are removed suggests that scarring effects may be less than the initial decrease in employment might suggest.[11] A third lesson is for policy-making. Scarring is directly related to macroeconomic conditions. As with so many other labour market outcomes, the best policy to avoid or minimise scarring will be effective use of fiscal policy to promote employment creation. Beyond that, having policies that prevent spillover effects from unemployment (such as skill atrophy or reduced motivation), or which overcome stigma effects (for example, via wage subsidy programme to increase incentives for hiring young unemployed jobseekers), can reduce the size of scarring effects.

10 The interaction of weak macroeconomic conditions and decreased job mobility is also explored – and found to be important for explaining a long-run decline in incomes of young graduates following the Global Financial Crisis – by de Fontenay *et al*. (2020).

11 Another consideration may be the extent of structural change in the labour market that occurs due to the impact of COVID-19. Greater structural change may cause higher scarring costs due to mismatch – that is, workers being able to find jobs that match with their qualifications and/or skills.

References

General references

Borland, Jeff (2020), 'Where are we? Where are we going? The need for a transition plan', Labour Market Snapshot #61; accessed at: https://drive.google.com/file/d/1EEze6-rwkdcKgJ0iLWD7PfmWoMz8ob6Q/view

Borland, Jeff and Andrew Charlton (2020), 'The Australian labour market and the early impact of COVID-19: An assessment', *Australian Economic Review* 53(3): 297-324.

Fahrer, Jerome and Alex Heath (1992), 'The evolution of employment and unemployment in Australia', Reserve Bank of Australia, Discussion Paper 9215.

Reserve Bank of Australia (2020), 'Statement on Monetary Policy: May 2020'; accessed at: https://www.rba.gov.au/publications/smp/2020/may/

International studies of scarring

Altonji, Joseph, Lisa Kahn and Jamin Speer (2016), 'Cashier or consultant? Entry labor market conditions, field of study and career success', *Journal of Labor Economics*, 34(1): S361-S401.

Brunner, Beatrice and Andreas Kuhn (2014), 'The impact of labor market entry conditions on initial job assignment and wages', *Journal of Population Economics*, 27(3): 705-38.

Burgess, Simon, Carol Propper, Hedley Rees and Arran Shearer (2003), 'The class of 1981: The effects of early career unemployment on subsequent unemployment experiences', *Labour Economics*, 10, 291-309.

Cribb, Jonathan, Andrew Hood and Robert Joyce (2017), 'Entering the labour market in a weak economy: Scarring and insurance', Institute for Fiscal Studies, W17/27.

Cutler, David, Wei Huang and Adriana Lleras-Muney (2015), 'When does education matter? The protective effect of education for cohorts graduating in bad times', *Social Science and Medicine*, 127: 63-73.

Genda, Yuji, Ayako Kondo and Souichi Ohta (2010), 'Long-term effects of a recession at labor market entry in Japan and the United States', *Journal of Human Resources*, 45(1): 157-96.

Gregg, Paul (2001), 'The impact of youth unemployment on adult unemployment in the NCDS', *Economic Journal*, 111, F626-F653.

Heckman, James and George Borjas (1980), 'Does unemployment cause future unemployment? Definitions, questions and answers from a continuous time model of heterogeneity and state dependence', *Economica*, 47: 247-83.

Hershbein, Brad (2012), 'Graduating high school in a recession: Work, education and home production', B.E. *Journal of Economic Analysis and Policy*, 12(1): Article 3.

Kahn, Lisa (2010), 'The long-term labour market consequences of graduating from college in a bad economy', *Labour Economics*, 17, 303-16.

Maclean, Johanna Catherine (2013), 'The health effects of leaving school in a bad economy', *Journal of Health Economics*, 32(5): 951-64.

Neumark, David (2002), 'Youth labor markets in the U.S.: Shopping around versus staying put', *Review of Economics and Statistics*, 84(3): 462-82.

Oreopoulos, Philip, Till van Wachter and Andrew Heisz (2012), 'The short- and long-term career effects of graduating in a recession', *American Economic Journal: Applied Economics*, 4(1): 1-29.

Oyer, Paul (2006), 'Initial labor market conditions and long-term outcomes for economists', *Journal of Economic Perspectives*, 20(3): 143-60.

Oyer, Paul (2008), 'The making of an investment banker: Macroeconomic shocks, career outcome and lifetime income', *Journal of Finance*, 63(6): 2601-28.

Raaum, Odbjorn and Knut Roed (2006), 'Do business cycle conditions at the time of labor market entry affect future employment prospects?', *Review of Economics and Statistics*, 88(2): 193-210.

Rothstein, Jesse (2019), 'The lost generation? Scarring after the Great Recession', mimeo.

Schwandt, Hannes and Till von Wachter (2019), 'Unlucky cohorts: Estimating the Long-term effects of entering the labor market in a recession in large cross-section data sets', *Journal of Labor Economics*, 37(S1), S161-S198.

Speer, Jamin (2016), 'Wages, hours and the school-to-work transition: The consequences of leaving school in a recession for less educated men', B.E. *Journal of Economic Analysis and Policy*, 16(1): 97-124.

Australian studies of scarring

Andrews, Dan, Nathan Deutscher, Jonathan Hambur and David Hansell (2020), 'The career effects of labour market conditions at entry', Treasury Working Paper 2020-01.

Borland, Jeff (2000), 'Disaggregated models of unemployment', Melbourne Institute, Working Paper no.16/00.

Buddelmeyer, Hilke, Wang-Sheng Lee and Mark Wooden (2010), 'Low-paid employment and unemployment dynamics in Australia', *Economic Record*, 86, 28-48.

Carroll, Nicholas (2006), 'Explaining unemployment duration in Australia', *Economic Record*, 82: 298-314.

De Fontenay, Catherine, Bryn Lampe, Jessica Nugent and Patrick Jomini (2020), 'Climbing the jobs ladder slower: Young people in a weak labour market', Productivity Commission, Staff Working Paper, July.

Doiron, Denise and Tue Georgens (2008), 'State dependence in youth labour market experiences, and the evaluation of policy interventions', *Journal of Econometrics*, 145: 81-97.

Knights, Stephen, Mark Harris and Joanne Loundes (2002), 'Dynamic relationships in the Australian labour market: heterogeneity and state dependence', *Economic Record*, 78: 284-99.

Le, Anh and Paul Miller (2001), 'Is a risk index approach to unemployment possible?', *Economic Record*, 77: 51-70.

Marks, Gary, Kylie Hillman and Adrian Beavis (2002), 'Dynamics of the Australian youth labour market: the 1975 cohort, 1996 to 2000', LSAY Research Report 8-2003.

Table 1: Studies of impact of macroeconomic conditions at time of labour market entry on subsequent labour market outcomes – All workers

Study	*Sample*	*Data*	*Macroeconomic conditions variable*	*Main Results*
Burgess *et al*. (2003)	UK; Persons aged 16 to 51 years during sample period; 1981-97; Grouped into 3-year cohorts	[Cross-section] Labour Force Survey	Rate of UE (national) at time when cohorts were aged 16-18 years	A 1 SD increase (about 2 ppts) in ue rate at age 16-18 affects ue rate at ages 28-30: i] Males - Increase of 1 ppt for group with no qualifications; and decrease of -0.46 with mid-level qualifications; ii] Females – Increase of 1.36 ppt and decrease of 1.74 ppt respectively.
Raaum and Roed (2006)	Norway; Persons born 1961-74 – Labour market outcomes at 25 to 36 years; 1993-2000	[Longitudinal] Administrative data	Rate of UE (Municipal-level) at time when cohorts were aged 16 and 19 years	1] Elasticity of non-employment wrt ue rate at time of labour market entry: i] Equals 0.057 in initial year; and ii] Equals 0.039 in subsequent years (for shift from EMP to non-EMP). 2] Increase in ue rate from 1 ppt to 6 ppts increases time spent in ue by 2.2 months over 12 years.
Genda *et al*. (2010)	US and Japan; White males; Completed education in 1983 or later and have 1-12 years of potential experience; 1986-2005	[Cross-section] Japan – Labour Force Survey (Special Survey + Detailed Supplement); US – CPS (March supplement)	Rate of UE by region in year of labour market entry [Number of regions: Japan = 210; US = 1071]	Japan: i] Less than college edn - A 1 ppt rise in the ue rate at entry reduces the likelihood of being employed by 3-4 percentage points over 12 years; and imposes earning losses of 5-7%. Negative impact on earnings is due to a continuous decline in the probability of fulltime, regular employment; ii] College edn – Initial earnings loss of 4.6% decreasing to 2.3%. No significant effect on employment. US: i] Less than college edn – Initial earnings loss of 3.1% but disappears after 3 years; ii] College edn – Earnings loss of 1-1.5% which persists for 9 years. No significant effects on employment.
Hershbein (2012)	US; Graduate high school at ages 17-19 between 1975 and 1983; 1975-1998	[Longitudinal] NLSY79	Rate of UE (national) in year of graduation from high school	1] A 1 ppt increase in ue rate: i] Females - Increases non-employment by 2.5ppts in year after graduation. Thereafter effect gradually diminishes and is not significant after 5 years; ii] Males – No significant effect on non-employment. 2] Reduces real hourly wage by 1-2% for both males and females for 4 years. 3] Female non-employment adjusted to by increase in NLF; Some evidence of increase in college enrolment for males.
Brunner and Kuhn (2013)	Austria; Males in private sector in low and medium skill jobs; Aged 16 to 21 years at time of first entry into labour market and who start first regular employment between 1978 and 2000; 1978-2005	[Longitudinal] Austrian Social Security Database	Rate of UE by state (9) for males aged 16-65 years at time of labour market entry	1] A 1 ppt increase in the ue rate decreases the real daily wage at time of labour market entry by 0.9%. Effect appears to persist for up to 20 years. Lifetime loss in wages from 1 to 1.6%. 2] Lifetime wage loss is 1.6% for blue-collar and 0.3% for white collar. (Similar initial effect on wages, but divergence thereafter.) 3] Mechanisms – Entering labour market at time of downturn is associated with: a] Higher likelihood of spell of ue prior to getting job; and b] Getting a job with a firm that is smaller, younger, pays lower average compensation and is more likely to fail in the future. Initial employer explains about 2/3rds of lifetime wage loss.

Continued over page

Study	*Sample*	*Data*	*Macroeconomic conditions variable*	*Main Results*
Speer (2006)	US; Males with between 9-12 years of education; Left school after 1978; Obtained FT job in first 4 years after leaving school; Must be out of school for 2 consecutive years to count as having left school; 1979-2000	NLSY (1979)	Rate of UE (national) at time of entry to labour market	1] A 1 ppt increase in the ue rate at time of entry to the labour market: i] Reduces starting wage by 6% (about half due to industry/occupation downgrading); ii] Lowers probability of first job being FT by 2.2 ppt; iii] Reduces weeks worked in first year by 1.5 and total hours worked by 7% (from two-thirds to all of this is explained by increased time to find first job); and iv] Reduces annual earnings by 11.6%. 2] Effects on annual earnings and hours of work disappear after year of entry to labour market.
Cribb *et al*. (2017)	UK; Left education after 1971 and between ages 17 and 25 years; Examine outcomes within 10 years of leaving education; 1994-95 to 2015-16	[Cross-section] Family Expenditure Survey; Family Resources Survey	Rate of UE (national) at time of labour market entry	1] Increase of 4 ppts in the ue rate at time of entry: a] Decreases the probability of being in paid work in year of entry by 10.4 ppts; by 3.2 ppts after 2 years; and by about 1-2ppts through to 10 years; b] Decreases weekly earnings by 10.4 ppts in year of entry; 5.8% after 2 years; 2.2% after 5 years; thereafter not significant. 2] Effects on individual labour market income flow through to household income from labour market activity.
Schwandt and van Wachter (2019)	US; Aged 16 to 40 years; Graduated after 1960 and with less than 15 years of experience (potential or actual); 1976 to 2005;	[Cross-section] Current Population Survey (March); Decennial Census; ACS	Rate of UE (state-level) at time of labour market entry	1] An increase in the ue rate of 3 ppts: Decreases annual earnings in year of labour market entry by 11%; and by 2.6% after a decade (thereafter not significant). Cumulates to an average decrease of 6% per year over decade after entry. Effect on family income is about half the size. 2] Negative effect on hourly wage that persists for a decade. Initially very large effect on weeks worked, that disappears after 5-6 years. Smaller, but persistent, effect on usual weekly hours. 3] Strong negative correlation between size of impact and education attainment. Mainly due to differences in impact of starting ue rate on employment outcomes.

Table 2: Studies of impact of macroeconomic conditions at time of labour market entry on subsequent labour market outcomes – Graduates

Study	*Sample*	*Data*	*Macroeconomic conditions variable*	*Main Results*
Oreopoulos *et al*. (2012)	Canada; Males; Exclude workers who obtain a higher degree; 1982-99	[Longitudinal] Administrative data – Linked employer-employee	Rate of UE (province-level) at time of graduation	1] An increase in the ue rate of 5 ppts: i] Annual earnings are 9% at year of labour market entry, 4% after 5 years and 2% after 9 years. Majority of persistent effect is from decrease in weekly earnings. 2] Negative impact of higher ue rate at time of entry to labour market is inversely related to predicted labour market earnings. Lifetime costs are 4 to 5 times larger for lowest than highest quintile of predicted earnings. 3] Mechanism: New graduates in downturns are more likely to work at smaller and lower-paying firms. First 3-5 years after labour market entry sees a period of above-average job mobility. Extent of mobility and catch-up varies substantially by predicted earnings of graduates. Overall, reductions in firm quality and persistence of high ue rate post-entry appear to explain most of the lifetime earnings loss.
Liu *et al*. (2016)	Norway; Graduate between ages 20 to 30 years and from 1988 to 2003; 1988-2007	[Longitudinal] Administrative data	Rate of UE (Municipal-level) at time when cohorts were aged 16 and 19 years	1] A 1 ppt increase in ue rate: i] Decreases annual earnings by 6% in first 2 years post-graduation; Losses are 2.5% by fourth year and not significant thereafter. 2] Difference in negative impacts between public and private sector degrees – Only materialise several years after graduation. 3] A 1 ppt increase in ue rate causes a 2.1 ppt increase in proportion of mismatched workers in year of graduation. Effect persists for a decade. Appears to explain about one-half of overall negative effect on annual earnings.
Altonji *et al*. (2016)	US; Graduated from 1974-2011; Aged 22 to 35 and 0 to 13 years post-graduation; 1977-2012	[Longitudinal + Cross-section] NLSY79 + NLSY97; Current Population Survey (March); Other associated data sources	Rate of UE (Census division) by year of graduation	1] An increase of 4 ppts in ue rate at time of entry to labour market: i] Loss of earnings averages 1.8% per year over first 10 years; 2] Negative effect on probability of working FT for about 5 years; ii] Effect on wages that persists – although reduces in size over time. 3] Mechanisms: i] Occupation quality: In initial year post-graduation a decrease in occupation quality explains about one-quarter of effect on earnings. Effect of occupation quality disappears quickly; and ii] Little evidence of effect of match quality. 4] Largest negative effects for graduates with lowest predicted earnings – A 1 SD increase/decrease above mean earnings decreases/increases earnings loss by 50%.

Continued over page

Study	*Sample*	*Data*	*Macroeconomic conditions variable*	*Main Results*
Rothstein (2019)	US; Aged 22 to 40 years; 1978-2017	[Cross-section] Current Population Survey (March)	Rate of UE (State-level) in year of graduation	1] College graduates who entered the labour market in 2010-11 have employment rates and annual earnings about 2% lower than pre-recession cohorts. 2] Evidence that need to incorporate cohort effects into calculation of overall effect of downturn – As cohort effects on employment vary pro-cyclically.

Chart 1a: Relation between rate of unemployment at time of leaving full-time education and EMP/POP rate in first year after leaving full-time education, Australia, 2005-15

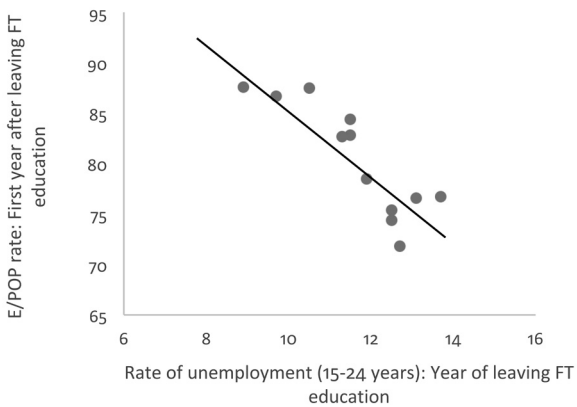
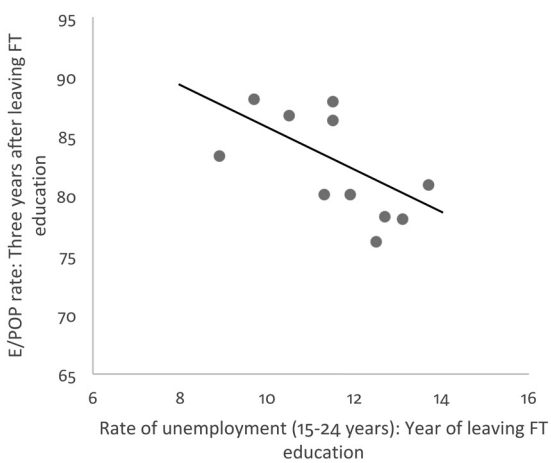


Chart 1b: Relation between rate of unemployment at time of leaving full-time education and EMP/POP rate three years after leaving full-time education, Australia, 2005-15



Data Appendix

- EMP/POP rate in the years after leaving FT education (HILDA): For each wave of the HILDA survey from 2005 to 2015 I identify persons aged 17 to 25 years who were observed to be in FT education in that year and not in FT education in both of the next two years. I then calculate the EMP/POP rate for that cohort in each wave for one, two and three years after.
- Rate of unemployment (ABS, Labour Force, Australia, 6202.0, Table 13): Average rate of unemployment for July-December (sa) in the year in which a cohort completed its FT education.

Table A1: Regression model for EMP/POP rate after leaving FT education, Australia, 2005-15

	Years after leaving FT education		
	1 year	*2 years*	*3 years*
Rate of ue in year of leaving FT education	-3.33** (0.60)	-2.96** (0.60)	-1.85* (0.80)
Constant	119.1 (7.5)	116.5 (7.2)	103.8 (9.0)
NOBs	11	11	11
Adjusted R-squared	0.714	0.687	0.320

Note: Standard errors are in parentheses. Asteriks: ** = significant at 1% level; * = significant at 5% level.

How might COVID-19 affect the Indigenous labour market?

Yonatan Dinku
Boyd Hunter
Francis Markham

Abstract

Macroeconomic shocks and the policy responses to those shocks have significant effects on Australia's economy. However, research into impacts of such shocks on the Indigenous labour force is limited. This paper explores how the COVID-19 crisis is likely to affect Indigenous labour market outcomes in future. While this paper briefly examines the immediate consequences of the COVID-19 crisis for Indigenous economic outcomes, it discusses the likely longer-run consequences for Indigenous employment at some length. The sectoral concentration of Indigenous employment, the relatively high levels of casual employment and the relatively young age profile of the Indigenous population may increase Indigenous exposure to significant economic risks. Indigenous business disproportionately employ Indigenous workers, but such businesses are concentrated in small to medium enterprises that may be sensitive to recessionary conditions, especially if economic uncertainty leads to a more generalised financial crisis involving liquidity constraints. Recent history demonstrates that Indigenous employment rates have increased only gradually in the long period of macroeconomic growth leading up to the pandemic. Historical disadvantage, discrimination and geographical constraints are important drivers of the dynamics of Indigenous labour market disadvantage, that limit educational attainment and ability to find work. For those Indigenous people who secure employment, it can be difficult to retain employment. COVID-19 is likely to lead to an intense period of structural adjustment in the economy, and it is important for the Indigenous community and businesses to position themselves to take advantage of potential opportunities and minimise potential risks. The ongoing digital divide may be a particular problem for Indigenous people accessing work remotely. Poor access to the internet of a substantial number of Indigenous households may also exacerbate access to remote education. Such issues have important implications for addressing Indigenous disadvantage in future.

JEL Codes: J15, J71, L26
Keywords: COVID-19, Discouraged workers, Discrimination, Social exclusion

1. Introduction

COVID-19 is a highly infectious disease that poses a serious challenge to all people given it is a *novel* virus for which there is effectively no scientifically validated treatment. Sanche *et al*. (2020) estimate a summary measure of infectiousness, the basic reproductive number or R_0, and find that COVID-19 has a median R_0 of 5.7, which is twice that estimated in the early stages of the outbreak in Wuhan. All outbreaks of disease are important for Indigenous people because pre-existing comorbidities exacerbate the impact of COVID-19, and because, in recent years, infectious disease outbreaks have disproportionately affected Indigenous Australians (e.g. Flint *et al*. 2010). A number of these comorbidities, for example obesity and diabetes, are associated with Indigenous poverty and social exclusion, which are arguably associated with the original act of dispossession and colonisation.

Of course another reason that this current pandemic resonates with Indigenous Australians is that first contact with European colonists was associated with a series of epidemics that lead to the death of around three-quarters of the pre-1788 population by 1850 (Hunter and Carmody 2015). COVID-19 has a substantially higher R_0 than the smallpox virus, the disease presumed by most analysts to be associated with the decimation of the pre-contact Indigenous population.[1] Disease in the early colonial period had a particularly destructive effect on both the Indigenous and Australian economy[2], but the current pandemic will not have a similarly devastating effect on the Australian economy going forward because there is a greater appreciation of the spread of disease. Notwithstanding, this article focuses on the likely implications of the COVID-19 pandemic for the Indigenous labour market in the short-run and reflects on possible long-run implications arising from any macroeconomic shocks to the Australian economy.

The medical and policy response to COVID-19 has focussed on the containment of the virus, including active surveillance, contact tracing, quarantine, and early strong social distancing efforts needed to limit transmission (Sanche *et al*. 2020). The containment policy has led to a substantial disruption to economic activity overall, but the disruption in the short-term has been most pronounced in sectors that are directly affected by government fiat and the social distancing regime that is preventing further transmission of the disease. The containment policies directly affect some industries and occupations that are either restricted in activities or completely closed. The net effect on the Australian economy has been a sharp decline in national economic activity, which is likely to be exacerbated by the inherent uncertainty of the health crisis and the ongoing need for further containment for future waves of outbreaks. The uncertainty arising from COVID-19 and the containment of the virus will amplify the original economic uncertainty inherent in recessions. The global nature of the health crisis and the evolving geopolitical environment may affect the volume and composition of international trade for a number of years.

---

1 Smallpox has a 95 per cent confidence interval for its R_0 of between 3.5-6 (Gani & Leach 2001).

2 Note that the Indigenous population out-numbered the colonists until well into the 1840s, so the effect of disease on Indigenous economic activity after 1788, is likely to dominate the effect of the disease on the whole Australian economy.

Research into impacts of macroeconomic shocks on the Indigenous labour force are limited, let alone the likely economic shocks emerging from this health crisis. This paper outlines some mechanisms of how macroeconomic shocks can affect the Indigenous labour market. The scarring effect discussed elsewhere in this issue by Jeff Borland, is particularly likely to affect Indigenous workers through the atrophying of human capital and the poor quality of job matches that can arise in a recession. However, the main effects on Indigenous workers are likely to be through the long-term effects of racial discrimination and historical social exclusion, which reduces the prospect of re-entry into the labour market following a recession and increases exits from employment and turnover between jobs that reduce the ability to build up labour market experience. It is reasonable to anticipate a particularly strong net discouraged worker effect for the Indigenous population after this recession, but a slow improvement in employment and labour force participation when the macroeconomic situation improves (see, Hunter and Gray 2012).

The next section outlines why COVID-19 has particularly important economic implications for Indigenous Australians, before we discuss some mechanisms by which the macro economy affects the Indigenous labour market. We then identify some Indigenous specific policy considerations of the pandemic, and bring together the limited evidence available on any potential short-run impacts of COVID-19. In order to do this, we use recent administrative, survey and census data on Indigenous and other Australians to identify the likely impacts on the Indigenous labour market. Given the disproportionate Indigenous employment in Indigenous business we also report some qualitative data on how Indigenous businesses are faring in the early stages of the pandemic. The concluding section reflects how the Indigenous labour market may be affected by structural and social change that may occur as result of the pandemic.

2. Why COVID-19 might affect the Indigenous labour market?

Most analyses of Indigenous labour market outcomes emphasise the role of racial discrimination and historical social exclusion with the initial processes of colonisation either killing Indigenous people through disease or massacre, leaving the survivors at a disadvantage in the labour market once legal discrimination was finally abolished. The lack of engagement with the market economy that evolved in Australia has led to low levels of labour market experience, educational outcomes and other accumulated endowments that facilitate labour market outcomes. Clearly, Indigenous people experience low levels of labour market outcomes because of differences in both labour market endowments and differences in the rewards for these endowments (Kalb *et al*. 2014). The latter component can be interpreted as the 'scope for discrimination' that can encompass unobservable factors, such as cultural differences, not captured in the statistical model.

Both endowments and discrimination have a role to play in understanding the possible effect of COVID-19 on the Indigenous labour market. The historical disadvantage and exclusion mean that Indigenous people are concentrated in particular

sectors or industries, particularly those that disproportionately include low-skilled, poorly-educated workers and other marginalised groups. Another characteristic of Indigenous workers is that they tend to be much younger than the rest of the Australian workforce, reflecting the relatively youthful structure of the Indigenous population. If these sectors are disproportionately affected by COVID-19, then Indigenous unemployment and participation may be particularly sensitive to the change in macroeconomic conditions.

As Australia enters a COVID-19 induced recession, another possible factor driving differences in labour market outcomes of Indigenous and other Australians is discrimination. Recent research has emphasised significant widespread unconscious bias against Indigenous Australians (Shirodkar 2020). The significance of this finding is that not all discrimination is explicit and unconscious bias could manifest itself in systematic discrimination that affects labour market outcomes.[3] The 'scope for discrimination' documented in Kalb *et al*. (2014) may or may not be a result of conscious behaviour or attitudes. Regardless of whether or not discriminatory behaviour and attitudes are conscious, they have profound labour market effects.

Discrimination is one of the reasons discouraged workers may leave the labour market during a recession. Groups who experience discrimination may doubt that they will have a good chance of securing employment when the overall job market is poor (Hunter and Gray 2012). This reduces the prospect of re-entry into the labour market following a recession, and increases exits from employment and turnover between jobs, further reducing the ability to build up labour market experience. As the overall probability of a job seeker finding work goes down, the first group to stop looking for work are marginalised groups who tend to be less competitive in the labour market even when the macroeconomic conditions are buoyant. Together it is reasonable to anticipate a particularly strong net discouraged worker effect for the Indigenous population after a recession.

Another important dynamic that may disadvantage Indigenous jobseekers who lose their jobs is the crowding out of Indigenous employment opportunity in low-wage sector. This may occur because more non-Indigenous job seekers who are competing for scarce jobs with an influx of educated and skilled job seekers who have lost their employment in the recession.

Frictional unemployment is driven by the period elapsed between moving from one job to the next and is often driven by the lack of job vacancies. However, the pandemic may lead to a reduction in the overall number of vacancies available, and hence reduce frictional unemployment, as more people hold on to current jobs rather than looking for alternative employment in other sectors to which individual workers may be better matched.[4] By staying in jobs longer, existing workers reduce the employment prospects of the newly unemployed that may include a disproportionate number of Indigenous people.

3 Shirodkar and Hunter (2020) demonstrate that unconscious bias is associated with significantly low rates of Indigenous entrepreneurship.

4 Mismatch between workers and jobs is common and has important implications for the labour market in its own right, but it is not explored here (see Mavromaras *et al*. 2009).

Another more subtle reason Indigenous unemployment may be particularly high in a COVID-19 recession is how discrimination and low levels of human capital concentrates Indigenous jobseekers in the low skill sector. Goldsmith *et al*. (2004) provide a theoretical neoclassical model where labour supply preferences adjust to the presence of employer discrimination as a result of the psychological processes of cognitive dissonance. In that model, discrimination is associated with lower wages and the resulting substitution effect reduces labour supply. This substitution effect is consistent with a standard neoclassical model, however, Goldsmith *et al*. (2004) also identify a 'resume effect' whereby job seekers have to take a job that they might not otherwise do or work at a lower rate of pay in their current job in order to demonstrate to the statistically discriminating employer that they are more productive than the employer originally thought. This response to the experience of discrimination could further concentrate Indigenous workers in the low-skill sector.

Employment inequality across sectors and persistent intergenerational effects of 'scarring' from unemployment will lead to diminished competitiveness in the labour market and harm the capacity to secure a suitable job. De Fontenay *et al*. (2020) provide evidence that these scarring effects can even occur when there is no recession, just a sustained period of weakness in sectors of the labour market that is reflected in low occupational mobility. This last condition is likely to be experienced by many Indigenous workers experiencing discrimination, irrespective of the macroeconomic conditions.

Slower economic growth and the increasing employment of older Australians since the global financial crisis had been crowding younger workers out of the labour market (de Fontenay *et al*. 2020). Borland (2020) argues the young are always hardest hit during economic downturns – needing to make the transition from education to work at a time when there are few new jobs on offer. Other reasons identified by Borland for the disproportionate effect on youth are: that a sizable group of older workers are likely to delay retirement to rebuild their superannuation balances; and that the young account for a disproportionate share of workers in industries being most affected by COVID-19 shutdowns, such as hospitality and retail trade. Third, the young are also a large proportion of casual employees who have been in their jobs for less than 12 months. The Indigenous workforce is disproportionately young, but this paper will demonstrate that sectoral concentration of employment, including the casual nature of much of Indigenous employment, is a proximate reason why the Indigenous labour market may be disproportionately affected by COVID-19.

Borland also argues that structural mismatch is likely to be a particular problem in a COVID-19 recession. First, both increases and decreases in labour demand are happening at the same time across different industries. Second, the decrease in labour supply is likely to be spread across industries. Hence, there will be some production activities where extra workers are needed and in some there will be a surplus of workers. Given the nature of quarantining, these issues may be pronounced in particular areas or regions. The litany of potential issues for the Australian labour market arising from the pandemic, include: supply chain effects, structural mismatch, long-run adjustment and factor mobility constraints (internationally and domestically).

The effect of COVID-19 on the Indigenous labour market will be manifested in a negative interaction of labour supply and demand. Let's briefly consider who

is demanding Indigenous workers. Hunter, Foley and Arthur (2019) show in the *Macquarie Atlas of Indigenous Australia*, that good Indigenous employment outcomes are historically associated with large diversified labour markets in major urban areas or in parts of the country where there is local sustained employment demand associated with a particularly buoyant sector (e.g., in 2016, coal mining in central Queensland and tourism in Tasmania generated a substantial number of jobs in the local market). The significant regional differences in the economic effects of COVID-19 that is becoming apparent with second wave outbreaks in particular regions, is likely to lead to locally depressed labour demand conditions that may interact with labour supply if mobility is constrained.

Discouraged workers are defined as people who want a job and are currently available for work but have given up actively searching for work because they believe they cannot find it.[5] The belief is likely to be justified in recessions, but it can also be associated with local labour demand and discrimination or labour supply preference associated with individual circumstances. Hunter and Gray (2001) argue that Indigenous Australians were between three and four times more likely to be discouraged workers than other Australians just after the 1990s recession. Hunter and Gray (2012) identified that the Indigenous labour market did improve slowly during a long period of economic growth after the 1990s, but the employment growth was not sufficient to close the gap in employment. Furthermore their finding was conditioned on the exclusion of the Community Development Employment Projects (CDEP) scheme employment, a government-funded community employment program. The argument for excluding CDEP is that it was program-driven 'employment' and was dependent on the level of funding allocated by Federal government.[6]

Indigenous employment rates did improve slowly during sustained periods of macroeconomic growth in the last 30 years, and the labour market gap between Indigenous and non-Indigenous Australians did close marginally in both remote and non-remote areas if CDEP jobs are excluded (Hunter and Gray 2012). The attachment to the labour market of Indigenous Australians did also improve very slowly over this

5 In economics, labour force status is determined in a two-stage process:
   a. individuals decide whether or not they wish to supply their labour to the market (socioeconomic status, the level of unemployment benefits, macro-economic conditions, and the level of labour demand).
   b. Employment driven by labour demand, incentives to search for work, and willingness to accept any job offers.

   Within this framework, individuals will become discouraged workers if they want to work but, because the costs of searching for work combined with the perceived poor chances of finding work, they do not search for work. The costs of searching for employment may be quite considerable as they include both the time involved, monetary costs and psychological impacts of the failure to find employment. Family factors, such as household composition, child care responsibilities, and difficulties with child care, are also likely to play an important role. Any analysis of Indigenous labour force status needs to take account of Indigenous-specific social and cultural factors, the behaviour of potential employers, and the interaction between labour supply & demand. (Hunter and Gray 2001).

6 If CDEP is considered to be employment, as it was by the majority of its participants, then Indigenous labour market conditions have deteriorated dramatically in remote areas over the last decade.

period. However with the onset of the COVID-19 recession we have good reason to expect that the decline in Indigenous employment and participation will be larger than that experienced by other Australians because: Indigenous people mostly live outside the main labour markets, are disproportionately young, are concentrated in casual and other jobs with limited prospects, have low levels of educational or other labour market endowments and that this is compounded by the all too common experience of discrimination.

3. Showing how the COVID-19 recession is relevant in the Indigenous labour market?

3.1 Reliance on social security

The recession arising from the economic disruption of COVID-19 will have a sustained and significant effect on the labour market. The unemployment and worker discouragement resulting from the economic downturn are likely to worsen employment outcomes for Indigenous Australians. Even before the pandemic, there was a particularly high rate of social security receipt among Indigenous Australians that reflects the ongoing relatively low level of employment. The Indigenous employment-to-population ratio among 15-64 years olds was just 49% before the pandemic, according to ABS survey data collected in 2018–19.[7] As Altman and Daly (1992) pointed out during the early 1990s recession, while the relatively low employment rate among Indigenous people excludes many Indigenous people from the benefits of employment income, it also partially insulates them to some degree during labour market downturns.

Administrative data from the early stages of the pandemic indicate substantial and disproportionate increases in Indigenous unemployment and underemployment. According to administrative data (DSS 2020), 100,600 Indigenous Australians were receiving payments related to unemployment in late February 2020.[8] By May 22, that number had increased to 141,100. As a percentage of the working-age Indigenous population, this constitutes an increase from 18.8 per cent to 26.3 per cent. By way of comparison, the non-Indigenous population receiving these benefits over the same time span rose from 4.5 per cent to 9.3 per cent. Clearly, the economic contraction forced a larger proportion of the Indigenous workforce to rely on government payments than the non-Indigenous workforce.

In this context, the Coronavirus Supplement has been crucial in alleviating Indigenous poverty. Indigenous poverty was already high prior to the pandemic, with estimates based on the 2016 Census suggesting poverty rates of 31 per cent for Indigenous people across the country, reaching 53.4 per cent in very remote areas (Markham & Biddle 2018). In this context, the role of the temporary Coronavirus

7 Authors' calculations from ABS 4715.0 (National Aboriginal and Torres Strait Islander Health Survey, 2018-19).

8 For comparability, we use the term 'payments related to unemployment' to refer to Newstart Allowance, Bereavement Allowance, Sickness Allowance and Youth Allowance (Other) in February 2020 and Jobseeker Allowance and Youth Allowance (Other) in May, as the Jobseeker Allowance combined the former three payments into a single new payment, with Youth Allowance (Other) remaining unaffected.

Supplement has not just been to support the newly unemployed and underemployed; it has also lifted many Indigenous households out of poverty for the first time (Markham 2020).

More onerous mutual obligations were suspended from March 20 as the prospects of finding employment was limited in a deep recession. Since August 4, mutual obligation requirements have slowly been reintroduced. The resumption of mutual obligations was trialed in remote Indigenous communities before being extended into the broader community of job seekers. Historically the mutual obligation requirements have been particularly onerous on Indigenous unemployed, especially in the Community Development Program (Fowkes 2019). There is emerging anecodotal evidence from several sources that substantial numbers of Indigenous people are dropping out of the social system altogether for short or extended periods to escape mutual obligation requirements that they find overly onerous (Community Affairs References Committee 2020), a phenomenon that has also been observed among non-Indigenous job seekers in recent years (O'Halloran, Farnworth & Thomacos, 2019). The re-imposition of mutual obligations could disproportionately affect the Indigenous jobseekers with a lower attachment to the labour market and less savings to invest in the resources required for job search.

Mobility restrictions may also impact on the Indigenous labour market.[9] However, these mobility restrictions were largely Indigenous-led and supported, and were concentrated in remote areas where the number of job vacancies are already extremely limited. If further waves of infection reach remote Australia, however, mobility restrictions (whether state sanctioned or Indigenous-led) are likely to have a greater impact.

The health advice for COVID-19 singles out Indigenous people over 50 years old as a particularly vulnerable group. While on average Indigenous people are more likely to have comorbidities that put them in the risk of contracting a serious case of the virus. This medical advice has some merit, in a statistical sense, however if it leads to differential treatment of Indigenous people it could further damage the labour market prospects of workers and job seekers even if they do not have the comorbidities that drive the medical concern.

9 A series of mobility restrictions in remote areas have been enacted by Indigenous land trusts and by state, territory and federal governments (see Smith 2020 for an account of these restrictions). Federal mobility restrictions, were introduced under the *Biosecurity Act* on March 26, 2020 and lifted on July 10, 2020, and barred entry to designated areas except after a 14-day quarantine period. The designated area covered much of remote Australia, including: the Ngaanyatjarraku lands, the East Pilbara, and Kimberley in WA; all of the non-urban NT excluding pastoral stations; the Anangu Pitjantjatjara Yankunytjatjara lands, Maralinga Tjarutja lands, and Aboriginal Lands Trusts lands in SA; and much of Cape York and the Gulf of Carpentaria in Qld (see http://web.archive.org/web/20200820011230/https://www.wa.gov.au/sites/default/files/2020-03/Australia%20-%20Designated%20Biosecurity%20Area%20-%20FINAL%20260330.pdf). At the time of writing in mid-August 2020, some land trust enforced and state government restrictions on mobility remain in place.

3.2 Composition of employment and short-term impacts on Indigenous labour market: Casual, youth and gender

Wilkins (2020) provides evidence on the demographic groups most likely to be experiencing the worst economic effects of COVID-19 by combining information on job losses by industry in the early stages of the pandemic with characteristics of people from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. He identified the directly affected and secondarily affected Industries based on industries that have been prohibited from operating or severely constrained in their operations.[10] Around 28 per cent of the workforce are in industries affected by COVID-19 with younger and female workers being disproportionately likely to be employed in such industries according to recent HILDA data. Wilkins findings were confirmed by the ABS data, with workers aged less than 20 years old losing 14.6 per cent of jobs between 14 March and 2 May 2020, substantially more job losses than any other age group (ABS 2020b).

While Wilkins (2020) did not report the Indigenous status of workers in affected industries, we can estimate the likely proportion of Indigenous workers in those industries using the most recent ABS data that includes an Indigenous identifier. Table 1 shows that Indigenous workers are slightly more likely than other Australians to be employed in the directly affected and secondarily affected Industries (33.4 per cent versus 28 per cent).

Table 1. Indigenous workers by COVID-19 affected industries

	Directly impacted	*Secondarily Impacted*	*Other Industries*
Per cent employed			
Indigenous	10.0%	23.4%	66.6%
Australia	8.0%	20.0%	72.0%

Source: Wilkins (2020); Indigenous estimates derived from NATSIHS, 2018-19.

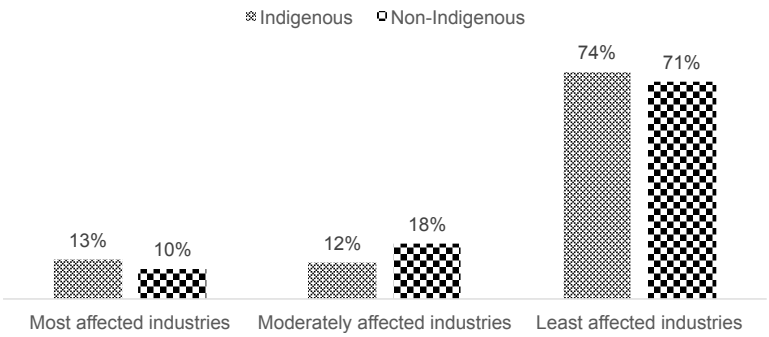
The ABS (2020b) data on weekly payroll jobs and wage statistics provides more direct insight into the likely short-term impacts of COVID-19 on the Indigenous workforce. Rather than using Wilkins method that was formulated before payroll data was available, we can estimate the industries that lost most jobs after 14 March 2020. Up to 2 May 2020, the industries that lost most jobs were: Accommodation & food

10 Directly adversely affected industries were largely forced to cease operations as a result of public health measures in March 2020 (eg, Food and Beverage Services; Air and Space Transport; Heritage Activities; Creative and Performing Arts Activities; Sports and Recreation Activities; and Gambling Activities). Secondarily adversely affected industries are able to continue operating, but experienced precipitous declines in business (eg, Textile, Leather, Clothing and Footwear Manufacturing; Furniture; Motor Vehicle Wholesaling and Retailing; Accommodation; Real Estate Services; Tertiary Education; Other Education; Social Assistance Services; and Personal and Other Services).

services (254k); Professional/technical services (130k); Construction (77k), Retail (75k); Manufacturing (64k); Other services (50k); Arts and recreation (47k).[11] These job losses can be expressed as a percentage loss from the March data and ranked in three categories: most-affected, moderately-affected and least-affected industries. The least affected industries are those whose job loss is less than the average job loss between March and May (7.1 per cent fewer jobs). Most affected industries, which experience job loss prevalence >14.2 per cent (i.e., over twice the average job loss) include: Oil and Gas Extraction; Accommodation; Food and Beverage Services; Other Transport; Motion Picture and Sound Recording Activities; Adult, Community and Other Education; Creative and Performing Arts Activities; Sports and Recreation Activities. Moderately affected industries include those with job loss prevalence between 7.1 per cent and 14.2 per cent. These industry categories are used to compare with the recent ABS data that includes the characteristics of Indigenous and non-Indigenous workers (see sources in Figure 1).

Figure 1 illustrates that Indigenous workers are somewhat more likely to be employed in the most affected industries and the least affected industries.[12] On the face of it that would seem to indicate that we should not be too concerned about the short-term employment effects of COVID-19 on Indigenous workforce. But this method can be used to dig deeper into the characteristics of workers in terms of rates of casual employment, demographics, household income.

Figure 1. Proportion of workers in COVID-19 affected industries by Indigenous status, 2018-19



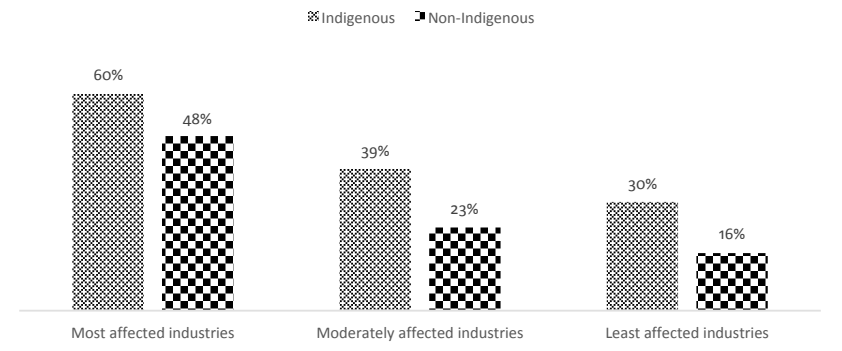
Sources: Author's calculations from ABS (2019a), ABS 4715.0 (National Aboriginal and Torres Strait Islander Health Survey, 2018-19) and ABS 6160.0.55.001 (Weekly Payroll Jobs and Wages in Australia, Week ending 2 May 2020)

11 These statistics are limited to what the ABS term 'payroll jobs', or relationships between an employer and employee where the employee is paid by through accounting or payroll software that reports back to the Australian Tax Office. Accordingly, employees who were stood down but received payment through the Commonwealth's 'JobKeeper' scheme are classified as employed, while those temporarily stood down but not receiving any income from their employer are classified as unemployed.

12 Note, Indigenous employment is historically concentrated in the public sector, which is less likely to be affected by a reduction in aggregate demand (Altman and Daly 1992).

The 2014/15 NATSISS shows that 45.6 per cent of Indigenous casual workers were in their current job for less than 12 months. Figure 2 illustrates that more casuals are employed in the most-affected industries than in other industries. Indeed, the majority of Indigenous workers are casually employed in those industries (60 per cent), compared to 39 per cent and 30 per cent in either the moderately and least affected industries. Within the most affected industries, Indigenous workers are substantially more likely to be casual than their non-Indigenous counterparts (60 per cent and 48 per cent respectively, a differential of 12 percentage points). The differential is even larger in the other industry categories; that is a 16 and 14 percentage point differential in the moderately affected and least affected industries. Given the structure of the JobKeeper program effectively excludes short-term and casual employment, it is reasonable to expect that Indigenous workers will be more disadvantaged than non-Indigenous workers. Furthermore, the longer term effects of a COVID-19 recession is likely to be pronounced for Indigenous workers given that casual workers are most likely to lose their work in a downturn due to the reduced security afforded by their employment contracts.

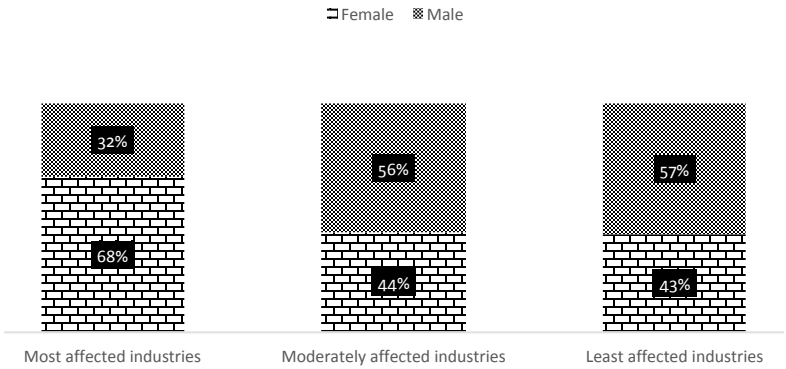
Figure 2. Percentage of workers employed as casuals by short-term employment impact and Indigenous status



Sources: Author's calculations from ABS 6333.0.00.001 (Characteristics of Employment, Australia, August 2019), ABS 4715.0 (National Aboriginal and Torres Strait Islander Health Survey, 2018-19) and ABS 6160.0.55.001 (Weekly Payroll Jobs and Wages in Australia, Week ending 2 May 2020)
Note: 'Casual employment' is defined in terms of access to paid leave entitlements.

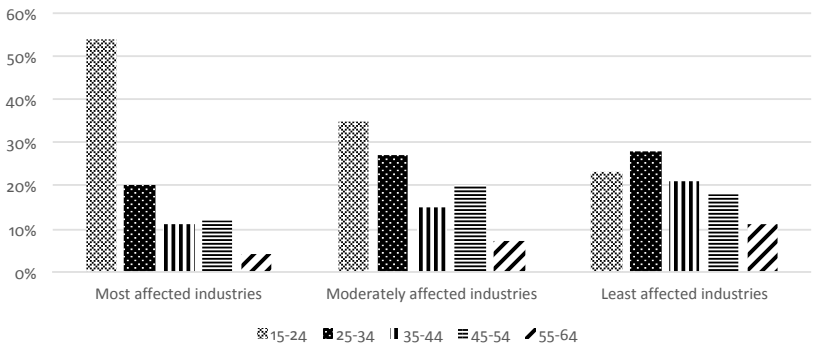
The remainder of the statistics identified in this section refers solely to the Indigenous workforce. Another group identified by Wilkins (2020) as being affected by COVID-19 is the female workforce. Figure 3 illustrates that Indigenous workforces is more likely to be female in the industries most affected by COVID-19. The moderately affected industries is actually less likely to be female with just over 40 per cent of workers being female. Nevertheless, the main point to note here is that, Indigenous females are likely to be amongst the groups most affected by COVID-19.

Figure 3. Percentage of Indigenous workers by gender and short-term employment impact



Sources: Author's calculations ABS 4715.0 (National Aboriginal and Torres Strait Islander Health Survey, 2018-19) and ABS 6160.0.55.001 (Weekly Payroll Jobs and Wages in Australia, Week ending 2 May 2020)

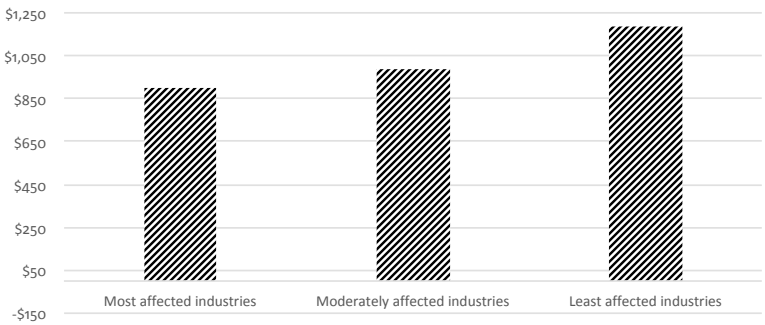
Figure 4. Percentage of Indigenous workers by age group and short-term employment impact



Sources: Author's calculations ABS 4715.0 (National Aboriginal and Torres Strait Islander Health Survey, 2018-19) and ABS 6160.0.55.001 (Weekly Payroll Jobs and Wages in Australia, Week ending 2 May 2020)

Like Wilkins 2020, Figure 4 demonstrates that the most affected industries tend to have high concentrations of young workers, with over 50 per cent of workers being aged between 15 and 24. To some extent, this reflects the casualisation of the workers in those industries, but it underscores the importance of understanding the labour market dynamics of the process of scarring discussed above.

Figure 5. Household income of Indigenous workers by short-term employment impact of their industry



Sources: Author's calculations ABS 4715.0 (National Aboriginal and Torres Strait Islander Health Survey, 2018-19) and ABS 6160.0.55.001 (Weekly Payroll Jobs and Wages in Australia, Week ending 2 May 2020)

Wilkins (2020) identified that affected industries were associated with low wage rates (measured hourly or weekly). Figure 5 is consistent with this observation and that the gross median income of households that include Indigenous workers employed in most affected industries is substantially lower than households that include workers employed in either moderately affected or least affected industries. Living in households with particular low income is a risk factor which compounds the effect of being in casual industries with no access to paid leave (i.e. casual work). Even if workers want to comply with the social injunction not to go to work while sick, there may be additional financial pressure from a tight household budget that might make it imperative that the worker ignores early signs of the illness. Access to paid pandemic leave, and who funds that leave, are important social policy issues that have broader public policy and health implications than simply being an industrial issue.

4. COVID-19 and Australian business

Much of the focus of Australia's policy response to COVID-19 is on the relationship of employers and employees. However, we now tend to an explicit focus on the impact of the pandemic on business and the self-employed. Biddle *et al*. (2020) use ANU Poll on COVID-19 collected between 14 and 27 April 2020 to analyse the impact on the Australian self-employed, an important subset of Australian businesses who tend to be smaller operations that may be particularly sensitive to economic shocks. It is the first longitudinal survey data on the impact of COVID-19 in Australia, with respondents being also interviewed in January and February 2020.

The probability of being employed fell for both self-employed and employees at a level commensurate with the seasonally adjusted employment decline measured in the April Labour Force Survey. However, Biddle *et al*. (2020) provided important insight into the early impact on Australian business. Almost half experienced a decrease in

profits that was either 'substantial', completely eliminated, or had gone out of business. Almost a third of the self-employed did not think their business was viable over the next two months if current trends continued. This uncertainty appears to be leading to significant fear, anxiety, and psychological distress amongst the self-employed.

The ANU Poll data also found that compared to employees, the self-employed had a higher reduction in hours worked, a greater reduction in income, an increase in the probability of not thinking current income was sufficient to meet expenditure (compared to a decline for employees) and a higher chance of accessing retirement savings and/or superannuation early. The income finding is not surprising as economic uncertainty associated with a COVID-19 recession will affect the aggregate demand for goods and services from businesses; while on the other side, the JobKeeper program has put a limit on the income losses of employees and, in the case of some low paid or part-time workers may have actually increased income. However, ongoing uncertainty and the winding back of the JobKeeper package may lead to a convergence of the experience between self-employed and employees.

Hunter (2015) demonstrates that Indigenous businesses are particularly important for Indigenous employment since they are up to 100 times more likely to employ Indigenous workers than other Australian businesses. At least until the COVID-19 recession, the Indigenous business sector has been growing rapidly (Shirodkar, Hunter and Foley 2018). However, Hunter (2015) demonstrates that Indigenous businesses are disproportionately concentrated in small to medium enterprises that may be particularly affected by a long COVID-19 recession, especially if it compromises cash flow and liquidity of the firm.

The Indigenous peak organisation for Indigenous businesses, Supply Nation, conducted a survey of members in the early stages of the COVID-19 shutdown. A substantial number of businesses were confused by the government's initial messaging. While the policy response has been clarified, it is evolving, not least of which because the government is trying to ascertain the likely evolution of the pandemic. Quantitative and Qualitative data were collected from 49 Indigenous businesses, who responded to the invitation to participate. It was effectively a convenience sample of over 2 per cent of Indigenous businesses covered by Supply Nation. It is a non-probability sample, but the qualitative responses yield some insight into the experience of Indigenous businesses in the pandemic. Consistent with expectations, around 85 per cent of the verbatim responses on the revenue impact of COVID-19 were negative; while 68 per cent of response on the business impact of COVID-19 were negative. In terms of businesses operating over the next 6 months, 45 per cent of responses were negative, with 78 per cent mentioning 'cashflow' as key. The following verbatim responses from the respondents to the Supply Nation Survey are illustrative of the stress many Indigenous businesses were experiencing:

> *Hospitality & food events cancelled. Online sales down as people are watching money perhaps? Wholesale orders non-existent as 95% of our wholesale customers are food based businesses/tourist venues who have been shut or closed voluntarily.*

Our ability to keep delivery on projects and winning new contracts. We probably have about 3 months of future work, which is more than most in business so we consider ourselves lucky.

By the end of this week, week ending 29.3.20 all permanent jobs have been put on hold until after the COVID-19 outcomes or after lockdown. A 100% of CASHFLOW has gone.

The responses to the Supply Nation survey are consistent with the latest data on business impacts of COVID-19 (ABS 2020a). Two in five (42 per cent) Australian businesses are currently accessing support measures such as wage subsidies, deferring loan repayments or renegotiating rental or lease arrangements, to manage the impacts. Large businesses are less likely than either small or medium businesses to access support (38 per cent as opposed to 42 per cent and 53 per cent respectively). One in ten businesses expects to close the business if support measures were no longer available. Two-thirds of businesses reported a decrease in revenue compared to last year. Around 46 per cent of businesses made workforce changes such as working from home or reduced staffing.

On 30 March 2020, the JobKeeper was announced, just after the above survey responses were collected by Supply Nation. On 21 July 2020, JobKeeper was extended until 28 March 2021, although there are some changes to the eligibility criteria and payment amounts. Given the level of distress Indigenous businesses were under before JobKeeper, and the second waves of infection in the community, JobKeeper may allow some of these Indigenous businesses to survive post-COVID-19. However, the relatively small size of businesses in this sector and the reliance on short-term cashflow may mean that the Indigenous business sector may disproportionately be affected by the recession. However, Supply Nation businesses may be protected somewhat by procurement contracts with governments and larger businesses.

Indigenous employment, like all employment, is driven by the location of businesses (Hunter, Foley and Arthur 2019). Even though Indigenous people are more likely to live in regional and remote areas most Indigenous businesses are concentrated in east coast urban areas where the labour and product markets are most developed, as well as regional parts of the eastern states of Queensland, New South Wales, Victoria and Tasmania. This asymmetry between the distribution of jobs and the distribution of Indigenous population has important implications for the long-run or persistent effects of COVID-19 that we explore in the next section.

5. Long-run/persistent effects of COVID-19 crisis

Recessions, particularly those as deep and potentially sustained as that associated with an ongoing pandemic, can be associated with profound structural & social change. The extent of unemployment and subsequent reallocation of labour has been suppressed temporarily by the JobKeeper program, which has prevented some businesses from closing at this stage. Medium and longer term effect of COVID-19 will include structural adjustment and changes in industry composition because of closures and flow-on effects on depressed aggregate demand, labour shortages in sectors relying

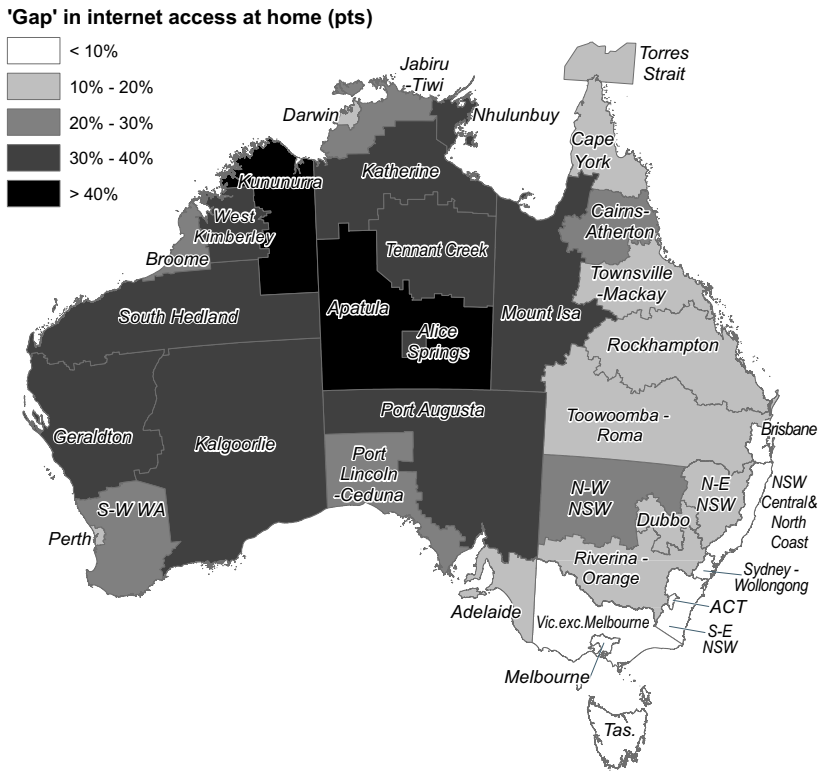
on temporary migration and potentially adverse conditions for international trade/ shipping. The recession is likely to be drawn out, perhaps a 'wheel-barrow' shaped recovery or even an 'extended w' recession with a number of declines in the recovery phases associated with the second and subsequent waves of the disease. These waves may be macroeconomic in nature or geographically focussed (such as the second wave in Victoria after June 2020).

China may have saved Australia from a macroeconomic recession after the global financial crisis because of demand for resources and international students funding the university sector. However, there is unlikely to be a trade-lead recovery, and policy needs to be get ready for a prolonged recession with internationally-exposed industries being particularly affected.

Recessions tend to be periods of concentrated structural change and even social change in the labour market. As discussed above, there are several reasons to expect the Indigenous population to be particularly affected by the COVID-19 recession in the long run: historical social exclusion, sectoral concentration, and ongoing discrimination that collectively produce labour market scarring and discouraged workers.

Some commentators see one of the positive effects of COVID-19 has been the productivity effects of behavioural change in the labour market with the widespread usage and adoption of Information and Communication Technologies (ICT) and telecommuting. However, with respect to the Indigenous population this carries an underappreciated risk that reifies existing structural inequalities in the labour market and educational sector that reinforces Indigenous disadvantage post-COVID-19. The digital divide between Indigenous and non-Indigenous internet access is going to be an important dynamic in Indigenous disadvantage (see Hunter & Radoll 2020). Figure 6 illustrates the digital divide between Indigenous and non-Indigenous Australians in 2016 with Indigenous access to the internet being lower in all parts of the Australian continent systematically across the continent. Even in the south-east corner of Australia there is a substantial gap in the internet access of up to 10%. Hunter & Radoll (2020) also show, even in areas where Indigenous internet usage increases for some households between 2011 and 2016, a substantial number of other Indigenous households in those areas lose access to the internet over time in the same areas.

Figure 6. Digital Divide between Indigenous and non-Indigenous Australians, 2016



Sources: ABS 2016 Census (TableBuilder)

Indigenous workers were 2.4 times less likely than non-Indigenous workers to be working from home on Census day in 2016 (2.2 per cent as opposed to 5.3 per cent). This differential is partially reflecting the types of jobs Indigenous people have. For example, occupations that involve direct interactions with clients or material exchange in the physical world are less amenable to employment that allows working remotely. Once we adjust for the fact that Indigenous workers have different occupations, that are less likely to involve using ICT, there is still a substantial gap in the proportion of Indigenous workers working from home (3.5 per cent compared to 5.3 per cent). That is after adjusting for occupation, at the 3-digit level, non-Indigenous workers were still 1.6 times more likely to be working from home.

If the labour market pivots towards ICT technology this could exacerbate the employment disadvantage that is already emerging for Indigenous jobseekers in the first six months of the pandemic. The need for broader social isolation has led to some schools being closed down and an explicit shift to remote learning. Given the large

digital divide between Indigenous and non-Indigenous Australians, there is substantial risk for the equitable distribution of education and training. Remote learning may reinforce structural disadvantage for Indigenous children (in competing with non-Indigenous children) and lead to scarring in long term economic outcomes and further foreclosing future labour market options for Indigenous Australians.

The short-term economic effects of COVID-19 are dramatic and substantial, but it is important to not lose sight of the long-terms challenges facing Indigenous people. If COVID-19 unwinds the labour market gains in closing the gaps between Indigenous and non-Indigenous Australians, this may presage the need for a more radical approach to Indigenous economic policy that takes into account persistent issues such as long-term social exclusion and discrimination.

References

Australian Bureau of Statistics (ABS) (2019a), *Characteristics of Employment, Australia, August*, cat. no. 6333.0.00.001, ABS, Canberra.

Australian Bureau of Statistics (ABS) (2019b), *National Aboriginal and Torres Strait Islander Health Survey*, 2018-19, cat. no. 4715.0, ABS, Canberra.

ABS (2020a), *Business Indicators, Business Impacts of COVID-19, July 2020*, cat. no. 5676.0.55.003, ABS, Canberra.

ABS (2020b), *Weekly Payroll Jobs and Wages in Australia*, cat no. 6160.0.55.001, ABS, Canberra. Biddle, N., Edwards, B., Gray, M. & Sollis, K. (2020), 'The initial impacts of COVID-19 on the self-employed', ANUPoll #33, ANU Centre for Social Research and Methods, Canberra. doi:10.26193/HLMZNW

Altman, J. C., & Daly, A. E. (1992), *Do fluctuations in the Australian macroeconomy influence Aboriginal employment status?* (Discussion Paper No. 21). Canberra: Centre for Aboriginal Economic Policy Research, ANU. Retrieved from Centre for Aboriginal Economic Policy Research, ANU website: http://hdl.handle.net/1885/145452

Borland, J. (2020), 'Scarring effects: A small piece of Australian evidence and a review of some main literature', Labour market snapshot #58, https://sites.google.com/site/borlandjum/labour-market-snapshots

Community Affairs References Committee (2020), *Adequacy of Newstart and related payments and alternative mechanisms to determine the level of income support payments in Australia*, Australian Parliament House, Canberra. https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/Newstartrelatedpayments/Report

de Fontenay, C., Lampe, B., Nugent, J. & Jomini, P. (2020), *Climbing the jobs ladder slower: Young people in a weak labour market*, Productivity Commission Staff Working Paper, July.

Department of Social Services. (2020), Senate Select Committee on COVID-19, Answer to Question on Notice SQ20-000453. https://www.aph.gov.au/DocumentStore.ashx?id=6e2933ff-bf91-4b84-af44-107f111f5cb4

Flint, S. M., Davis, J. S., Su, J.-Y., Oliver-Landry, E. P., Rogers, B. A., Goldstein, A., … Tong, S. Y. C. (2010), Disproportionate impact of pandemic (H1N1) 2009 influenza on Indigenous people in the Top End of Australia's Northern Territory. *Medical Journal of Australia*, 192(10): 617–622.

Fowkes, L. (2019), The application of income support obligations and penalties to remote Indigenous Australians, 2013–2018, Working Paper No. 126, CAEPR, ANU, Canberra. https://doi.org/10.25911/5c6e71dd22f05

Gani, R. & Leach, S. (2001), Transmission potential of smallpox in contemporary populations. Nature. 414 (6865): 748–751. doi:10.1038/414748a

Goldsmith, A.H., S. Sedo, W. Darity & D. Hamilton (2004), The labor supply consequences of perceptions of employer discrimination during search and on-the-job: Integrating neoclassical theory and cognitive dissonance. *Journal of Economic Psychology*, 25(1): 15–39.

Hunter, B. (2015), 'Whose business is it to employ Indigenous workers?', Economics and *Labour Relations Review*, 26(4): 631–651, DOI:10.1177/1035304615598526.

Hunter, B.H. & Carmody, J. (2015), 'Estimating the Aboriginal population in early colonial Australia: the role of chickenpox reconsidered', *Australian Economic History Review*, 55(2): 112–138.

Hunter, B., Foley, D. & Arthur, W.S. (2019), 'Economic life' in W.S. Arthur and F. Morphy (eds) *Macquarie Atlas of Indigenous Australia*, Macquarie Library Pty Ltd, Sydney.

Hunter, B.H. & Gray, M.C. (2001), Indigenous Labour Force Status Re-visited: Factors associated with the discouraged worker phenomenon. *Australian Journal of Labour Economics*, 4(2): 115-37.

Hunter, B. & Gray, M. (2012), Indigenous Labour Supply following a Period of Strong Economic Growth. *Australian Journal of Labour Economics*, 15(2): 141–59.

Kalb, G., Le, T., Hunter, B. & Leung, F. (2014), Identifying Important Factors for Closing the Gap in Labour Force Status between Indigenous and Non-Indigenous Australians. *The Economic Record*, 90(291): 536–50.

Markham, F. (2020), COVID-19 and the Indigenous income crisis: Looking back and looking forward. In F. Markham, D. Smith, & F. Morphy (Eds.), Indigenous Australians and the COVID-19 crisis: Perspectives on public policy. Topical Issue no. 1/2020, Centre for Aboriginal Economic Policy Research, ANU, Canberra (pp. 6–9). https://doi.org/10.25911/5e8702ec1fba2

Markham, F., & Biddle, N. (2018), Income, poverty and inequality. 2016 Census Paper no. 2, Centre for Aboriginal Economic Policy Research, ANU, Canberra. http://caepr.cass.anu.edu.au/research/publications/income-poverty-and-inequality

Mavromaras, K, McGuinness, S & Fok, YK (2009), 'Assessing the incidence and wage effects of overskilling in the Australian labour market', *Economic Record*, 85(268): 60–72.

O'Halloran, D., Farnworth, L., & Thomacos, N. (2019), Australian employment services: Help or hindrance in the achievement of mutual obligation? *Australian Journal of Social Issues*. Early online publication. https://doi.org/10.1002/ajs4.82

Radoll, P. & Hunter, B. (2017), The Dynamics of the digital divide. *Working Paper 120*, CAEPR, The ANU, Canberra.

Sanche, S., Lin, Y., Xu, C., Romero-Severson, E., Hengartner, N., & Ke, R. (2020), High Contagiousness and Rapid Spread of Severe Acute Respiratory Syndrome Coronavirus 2. *Emerging Infectious Diseases*, 26(7): 1470–1477. https://dx.doi.org/10.3201/eid2607.200282

Shirodkar, S. (2020), Bias against Indigenous Australians: Implicit association test results for Australia [online]. *Journal of Australian Indigenous Issues*, 22(3-4): 3–34.

Shirodkar, S., Hunter, B. & Foley, D. (2018), Ongoing growth in the number of Indigenous Australians in business. *Working Paper 125*, CAEPR, The ANU, Canberra.

Smith, D. (2020), Governing the pandemic: Implications for Indigenous self-determination and self-governance. In F. Markham, D. Smith, & F.

Morphy (Eds.), Indigenous Australians and the COVID-19 crisis: *Perspectives on public policy* (pp. 10–13). Topical Issue 1/2020. Centre for Aboriginal Economic Policy Research, ANU. Retrieved from https://doi.org/10.25911/5e8702ec1fba2

Wilkins R. (2020), Who's hit hardest by the economic effects of COVID-19. *Research Insights 10/20* Melbourne Institute. The University of Melbourne, Melbourne.

The urgent need for Tax Reform in Australia in the COVID-19 World

Tristram Sainsbury and Robert Breunig[1] Tax and Transfer Policy Institute

Abstract

The economic shock and government response to COVID-19 highlight weaknesses in Australia's tax system. COVID-19 puts pressure on a system under strain from long-term structural forces and the tax-free and tax-reduced status of certain sources of income. Returning to a sound structural budget position cannot be accomplished through passive action that relies on 'natural' revenue growth from current tax sources. Discussions should focus on comprehensive reform. Reducing reliance on income (particularly labour) taxes and applying a more equal tax treatment to different individuals and income sources over time are priorities which will support improved well-being and labour market activity.

JEL Codes: H20, H21, H24, J08
Keywords:

1 We thank Phil Lewis and another of the editors of the *Australian Journal of Labour Economics* for useful comments on an earlier draft of the paper. We would also like to thank Alf Capito, Michelle DeNeise, Conny Lenneberg and Joe Zabar for their comments on an unpublished paper "Setting the Scene for Australian Tax Reform: A Revenue System under Strain and Delivering Outcomes at Odds to Good Tax Design" in which we summarised some of the arguments that we make in this paper.

Introduction

A tax system can be considered sound when it is able to fulfil its basic financing role over time. How sound is the Australian tax system? And how necessary is tax reform to securing a sound foundation in the aftermath of COVID-19? These are the questions that we turn to in this article.

We first detail a framework for evaluating the tax system. We then explain how longer-term trends were such that Australia's main sources of tax were under pressure before COVID-19 and that the Australian tax mix renders any conversation about meaningful tax reform in Australia largely one about income taxation. We follow this by highlighting how 'tax free' designations on a range of income sources have led to the perverse outcome where it is now feasible for someone with household assets worth $10 million, generating a comfortable lifestyle, to pay less income tax than someone earning income close to the poverty line. In addition to flying in the face of common sense, such outcomes violate the core tax design principles of equity, efficiency and simplicity.

We put forward a case for comprehensive, structural tax reform to be a central plank in efforts to manage the post-COVID-19 Australian economy. The debt repair challenge that the government response to COVID-19 presents will prove to be too large to be addressed through passive action, such as allowing 'natural' revenue growth via bracket creep and from increased collections from companies when economic activity recovers to something resembling more 'normal' settings. Finally, when considering reform options, important context is that COVID-19 represents a significant transfer from the current working age population to the current older population.

We conclude with a suggestion that a comprehensive tax reform agenda should focus on a fairer, simpler tax system that supports economic growth and has fewer fiscal vulnerabilities. This agenda should be delivered through reducing the share of income (particularly labour) taxes in the Commonwealth tax mix and moving towards a more equal tax treatment of individuals and income sources over time. Australia's heavy reliance on direct taxation--income and corporate tax—falls heavily on workers. Stamp duty reduces worker mobility and the current system of savings taxation punishes active workers relative to (mostly retired) non-workers. Fixing the taxation of savings, reducing the heavy reliance on direct taxation and switching from stamp duty to land tax will contribute to increased investment and labour market dynamism and job and wage growth.

Framework for assessing tax reform

A constructive conversation about taxation reform relies on a framework (or benchmark) for assessing taxation. In general, there is some common foundational ground for assessing the Australian taxation system (see, for example, Tax and Transfer Policy Institute (TTPI 2018). It is generally accepted that the tax system should pay for what we need in a stable and sustainable way. With economic growth as key to raising living standards, the tax system should minimise distortions around decisions to work, invest and save (efficiency). At the same time, the tax system should treat people with equal ability to pay equally and expect those with a higher capacity to

pay to contribute a greater amount (fairness). The tax system should also be easy to understand and not have lots of technical rules that savvy people can exploit to avoid paying taxes (simplicity).

The general acceptance of these basic pillars of efficiency, fairness, and simplicity are a result of decades of Australian public tax debate, underpinned by a number of major taxation reviews. Most notable among these are the 1975 *Report of the Taxation Review Committee* chaired by Justice Ken Asprey (the Asprey Report – Asprey and Parsons 1975) and the 2009 *Review of Australia's Future Tax System* chaired by Ken Henry (the Henry Report – Commonwealth of Australia 2009).

The public policy reviews are supported and underpinned by an extensive public policy literature on optimal taxation theory that has its roots in Smith (1776), Ramsey (1927) and Mirrlees (1971). Among the number of highly valuable insights from the literature is the rule of thumb that a broad based and low rate form of taxation will prove to be less distortionary than a high rate, narrow based form of taxation (Mankiw *et al*. 2009); that taxation that is more neutral across tax forms will be less distortionary; and that the supply of savings is more elastic than income and therefore taxes on capital should be lower than taxes on income or consumption (Summers 1981).

The challenge for tax reformers comes about when considering the inherent trade-offs within and between the pillars. Any given proposal to change the tax (and transfer) system will not advance the basic pillars in an even way. Instead, changes require confronting trade-offs among and between the different pillars. The weighting put on subjective concepts such as fairness, in particular, will be based on individual philosophies, subjective valuations and analytical judgements. Invariably, the weightings we place on these concepts will diverge from the weighting others put on them.

Empirically, there is also uncertainty about the size and nature of distortions. For example, empirical studies have found large effects of tax settings on the composition of savings, but struggle to find large effects on the overall level of savings (see Varela, Breunig and Sobeck 2020). Likewise, it may be hard to estimate the size of deadweight losses arising from different taxes. The evidence is not always unambiguous in helping to decide which taxes should be raised and which lowered.

There are also limitations on how prescriptive modern (post-Mirrlees 1971) optimal tax theory can be in informing these tradeoffs, given its dependence on a number of specific assumptions. These include the shape of the social welfare function, the degree to which returns are based on (unobserved) ability, and how taxpayers respond to higher rates. Differences in value judgements on these concepts and competing interpretations of the evidence can lead to a range of estimates for 'optimal' top marginal tax rates that vary from 0 (Tuomala 1990) to more than 80 per cent (Piketty, Saez and Stancheva 2014). In addition, the narrow pursuit of (vertical) equity and efficiency objectives has generally led to the neglected consideration of crucial public finance principles such as the benefit principle, simplicity and horizontal equity.

A consequence is that economists are divided when asked questions about, for example, the desired shape of income taxes (Chicago Booth 2019). With economists sharply divided on the theory, it has proven nearly impossible to reach a public consensus around a raft of basic tax system design questions, such as how much

revenue the tax system should raise, or how progressive specific taxes should be in order to facilitate the movement from those designated rich to those designated poor.

Tax sustainability: COVID-19 will place pressure on the Australian tax system

COVID-19 has caused a profound shift in economic activity. People are behaving differently. Government actions to protect lives have further restricted opportunities and freedoms. Three months since the virus gained prominence within Western economies, it remains unclear how long emergency measures will need to be in place, and what form they will need to take.

The COVID-19 economic shock has demand and supply shock characteristics, both of which will directly impact on Australia's tax system. The demand shock arises from whole populations going into quarantine across every major economy in the world, reducing demand for Australian-supplied goods and services. The supply shock has a genesis both in restricted domestic activity, largely as a result of what forms of economic behavior governments have determined to be legal, and from newfound global impediments to the flow of people and goods.

The government response to address the economic consequences of COVID-19 has been comprehensive. While it is still too early to determine the distributional impacts of the shock or the impact of the myriad government measures, it is apparent that a wide range of people have been affected detrimentally. In the face of declining incomes and reduced consumption, Australia's tax and transfer system is dampening the negative impact on people and businesses. One consequence of the automatic stabiliser function and the new, temporary assistance programs has been a significant addition to Australia's public debt, shared across multiple levels of government. Early attempts at estimating the medium-term fiscal consequences of the shock at the Commonwealth level alone from PwC (2020) and the Parliamentary Budget Office (2020) suggest a revenue hole in the (broad) range of $10-$50 billion annually by 2029-30, with potential deficits for a generation.

Australian Treasury Secretary Steven Kennedy has observed that heightened debt levels can be effectively managed through a sound structural budget and long-term focus on full employment (Karp 2020). A prospective and sizeable long run 'revenue hole' places tax sustainability as a central concern in ensuring that Australia has a sound structural budget. And tax sustainability takes on heightened interest considering the Australian tax mix was already under strain before COVID-19.

The Australian tax mix was under strain before COVID-19

At the Commonwealth government level, Australia's tax system is remarkably reliant on the direct taxation of people and businesses. While there are over 120 different taxes in Australia, in 2019-20, nine out of every ten dollars of tax raised by the Commonwealth government will be brought in from a narrow band of personal

income taxes[2], corporate income taxes[3] and the GST (Frydenberg and Cormann 2020). Three quarters of Commonwealth taxes come from just the personal and corporate income taxes – representing approximately a sixth of Australia's GDP.

A point made in major Australian tax reviews, as well as in a range of publications from international institutions such as the IMF (International Monetary Fund, 2020) and the OECD, is that Australia's strong reliance on income taxes for revenue-raising makes us something of an outlier among the international community. Many OECD countries have broader and more diversified tax bases and make greater use of consumption and other tax bases such as land.

In addition, the three main sources of tax (personal, corporate and consumption) have become increasingly concentrated in recent decades. Davis *et al*. (2019) estimate that since the mid-1990s, Australia's personal income tax base has become more concentrated on a narrow band of high-earning personal taxpayers. In any given year, close to 50 per cent of Australia's personal income tax will be raised from the top 10 per cent of income earners who are taxed at high marginal income tax rates. Around half of the adult population will not pay any income tax.

The revenue-raising burden from corporate income taxes is even more concentrated than for personal taxpayers. The ATO corporate tax transparency report for the 2017-18 year revealed that half of the $52 billion in corporate income tax payable in 2017-18 was paid by just 18 companies, predominately located in the banking and resources sectors (ATO2019a). The report also reveals that approximately half of the $83.5 billion in total company tax collected in 2017-18 was paid by 170 companies. Regardless of the choice of base, it is clear that corporate income tax in Australia relies on a highly concentrated set of companies.

A succession of analyses from the likes of the Australian Treasury and Parliamentary Budget Office have shown that households spending more of their budgets on rent, health, education and international internet purchases over time has reduced the share of consumption that is subject to the GST, while the slow growth in the consumption of excisable goods has meant that associated excise and customs duties (an additional 8 per cent of tax receipts) have undergone a gradual decline in revenue-raising prominence.

A growing literature is raising concerns around the longer-term sustainability of these sources of taxation. Notably, the Parliamentary Budget Office (2018) warned that the coming decade can be anticipated to see pressure on all three of these tax bases: personal income, corporate income and consumption tax. In sum, all of these problems will get worse with inaction.

Three trends were specifically highlighted: the ageing of the Australian population, combined with continued attractiveness of investing through superannuation, leading to an increasing proportion of labour income being taxed concessionally; ongoing pressure to lower company tax rates amid significant

2 Personal income taxes here refers to individuals and other withholding taxes, fringe benefits tax and superannuation tax.

3 Corporate income taxes here refers to company tax, the Petroleum Resource Rent Tax and the Bank levy.

uncertainty in global corporate tax settings due to accelerating technological, global economic and commercial change; and structural trends in consumer behavior and technological change driving a continued downward trend in consumption taxes.

As a broad generalisation, the baseline or 'status quo' pre-COVID-19 scenario suggested that if Australia were to merely retain revenue collections at current levels, then personal income taxpayers – and particularly a narrow group of higher-earning wage and salary earners already paying high tax rates – can be expected to shoulder more of the taxpaying burden. This has obvious negative consequences on human capital investment and individual, entrepreneurial behaviour.

Further, there are two reasons, one policy-based and one conceptual, to question how robust revenue from personal taxpayers will prove to be post-COVID-19. The policy-based consideration is that one of the features of eliminating the third tax threshold as part of the 7-year tax plan (see ATO 2020a) is to dampen the revenue raising potency of bracket creep for some time to come.

The conceptual consideration, raised in Sainsbury and Breunig (2020), comes from three observations: there are a wide range of legal tax planning opportunities available to some taxpayers; there are strong incentives for taxpayers at all income levels to find legal ways to reduce their tax bills; and there has been growth in the adoption of tax-effective vehicles over time. While the strategies are legal options for taxpayers within a comprehensive income tax system, warning signs are evident.

For some, having the tax burden fall narrowly on high income earners is an attractive proposition. However, the reality is that this combination of opportunities for tax avoidance and a strong incentive created by high tax rates means that the tax burden falls quite heavily on some high income earners (those with limited flexibility around how they earn their income), while other high income individuals shoulder little or even none of the burden. Wage earners end up having to shoulder a heavy burden while those who are able to organise their employment in a company structure are often able to pay much lower taxes, particularly when combined with other vehicles for distributing income.

Australia's approach to income taxation is leading to outcomes that are at odds to the principles of good tax design

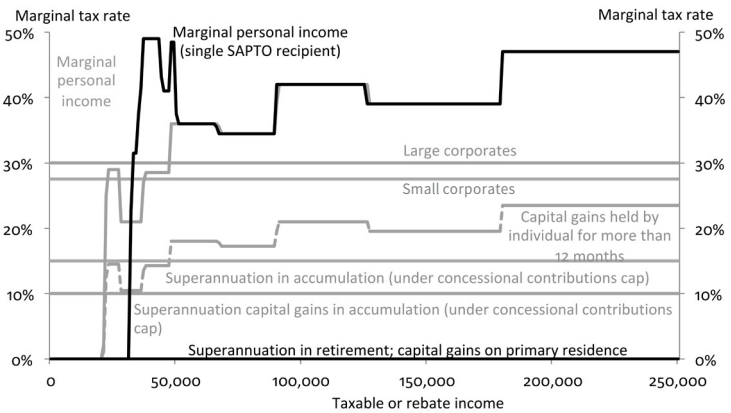
Based on the broadly-accepted Schanz-Haig-Simons[4] definition of income, Australia's hybrid[5] tax approach sees most forms of personal income (wages, salaries, interest, dividends and rent) taxed under a global regime at full progressive rates. Corporate income and some capital gains are taxed under the same global regime, but at flat rates. Some capital income receives discounted tax treatment under the global regime, while other capital income (linked to retirement savings) is taxed under its own schedule.

4 The comprehensive measure of income advocated for by Schanz (1896) and developed by Haig (1921) and Simons (1938) is generally considered by economists to be the best measure of wellbeing.

5 Hybrid refers to a mixture of comprehensive and schedular income tax structures.

The result is a complex web of marginal income tax rates, with marginal personal tax rates generally higher than the tax rates that apply to companies, capital gains and superannuation. The main rates relating to personal, corporate and capital income are depicted in Chart 1.

Chart 1. Main marginal tax rates in Australia, 2019-20



Source: Author's calculations. A variant of this chart is included in Sainsbury and Breunig (2020).

The differentials in tax rates for different forms of income reflect a variety of economic and social policy goals that successive governments have introduced into the tax system, including progressive taxation, the desire to provide a discount for capital gains and supporting saving for retirement through superannuation. Like any complex system, some design features have a stronger rationale than others. But overall, the shape of Australia's tax system reflects the kind of uneasy compromises that policymakers have to constantly grapple with when attempting to deliver a system that Australians accept.

One prominent set of differentials are the three[6] major areas of tax-free income, emphasised by the solid black lines in Chart 1. The first is capital gains on the primary residence, with no limits on how much can be realised tax-free. The second is the personal income tax-free threshold. For most Australians the tax-free threshold is $18,200. For Australians aged over 67 that are eligible for the seniors and pensioners tax offset (SAPTO), the threshold increases to $32,279 for an individual or $57,948 for a couple (ATO 2020b). And the third is tax-free superannuation in the retirement phase.

6 In addition to these, interactions with a range of exemptions and deductions on the incomes that are available to businesses can also lead to zero (or low) tax rates.

Taxpayers combining these tax-free thresholds to their maximum extent can lead to stark differences in tax burdens across the Australian population. However, such differences can be difficult to identify and measure through taxation data, given those within tax free thresholds are generally able to avoid lodging tax returns. That said, a more anecdotal approach can still be instructive.

To illustrate the differences, consider two individuals in the 2019-20 income year. Individual 1 and their partner both earn approximately $25,000 from casual employment. Individual 1 is carrying a small amount of debt and aspires towards home ownership in the future but has no assets. Individual 2 is a member of a couple that jointly (and fully) owns the following: a $5 million family home purchased 25 years ago and which for tax purposes is their primary residence; $3.2 million in assets held in a super fund – that they are drawing down for a return of $128,000 per annum (and is carrying a reasonable stock of unused franking credits); and $1.8 million in a share portfolio held outside super which yields annual dividends of $56,000, split equally between the two. Individual 2's household's $182,000 income stream, from share portfolio and super investments, finances a comfortable lifestyle such that neither member of the household feels the need to work. The situations of the two individuals are summarised in Table 1.

Table 1. Income sources and associated tax liabilities for two stylised individuals, 2019-20 year

Individual 1		*Individual 2*	
Labour earnings	$25k	Labour earnings	$0
Income streams from assets No assets as: • Rents home • Just opened a super balance • No dividend portfolio	$0	Income streams from assets • Primary residence – unrealised • Superannuation (4 per cent draw down, half of $3.2 million portfolio) • Dividends outside super (3 per cent return, half $1.8 million portfolio)	$0 $64k $27k
Total income	$25k	Total income	$91k
Total personal income tax	$1k	Total personal income tax	$0k

Source: Author's calculations.

Which individual pays more tax under the current Australian tax regime: the one with earnings that would be classified at or around the OECD's relative measure of poverty, or the member of a couple with $10 million in assets generating an income stream of $182,000? It may be surprising to discover that Individual 2 can pay not just less tax than Individual 1 (who pays approximately $1,000 in tax after factoring in personal income tax liability and relevant tax offsets and levies), but no tax. In fact, Individual 2 might be eligible to receive more in dividend refunds than Individual 1 earns.

Some additional details are required to understand how this is possible. Think about Individual 1 as someone aged in her early 20s and Individual 2 as a member of

a retired couple aged in her late 60s or early 70s. These ages are important as the 'no tax' situation for Individual 2 only comes about after exploiting four separate settings in the tax system.

First, the value accruing in the primary residence is not taxed until the property is realised (sold) – and capital gains made by the primary residence are tax free in any case. Second, because the couple are over 60, the earnings they generate through superannuation are tax free, subject to various asset thresholds. Third, because she is over 67, she can take advantage of a significant offset built into the personal income tax system: the Seniors and Pensioners Tax Offset (SAPTO). SAPTO eligibility for the couple means that her tax-free threshold is in effect, $28,974; her "rebate income" falls below that at just $27,000 per member of the couple. Fourth, due to the presence of refundable dividend imputation and Individual 2 remaining within tax-free thresholds for all income streams, Individual 2 could generate up to $25,025 (based on a 27.5 per cent corporate tax rate) or $27,300 (based on a 30 per cent tax rate) in dividend refunds.

The key implicit principle driving the difference in tax burdens is that Individual 2's asset mix is what public policy settings have designated as warranting 'tax-free' status. Deviations from the 'Individual 2 formula' are a cause for higher taxes. And it's not clear that there is a link between those receiving zero tax rates and people's capacity to pay tax. Which raises serious questions about fairness.

Individuals benefiting from a tax-free (or tax-reduced) lifestyle are likely to view it as a great development that should be retained. However, as outlined extensively by Breunig and Sainsbury (2020), tax rate differentials are a problematic feature of the Australian tax system. We will draw out some of these specific arguments as they apply to zero tax rates (which can be thought of as an extreme tax outcome – the lowest bound of statutory tax rates and therefore having the potential to produce the highest differential with other rates in the system).

Less fair

First, a strong argument can be made that zero tax outcomes reduce the fairness of the tax system. Fairness is a challenging concept to objectively analyse. This is partly because notions of fairness are subjective. There is no single view on what is fair. People form value judgements based on morals and ethics, and arguments are drawn from a range of theories and philosophies of distributive justice (e.g. Konow 2003 and Davis *et al*. 2019).

That noted, Davis *et al*. (2019) observe that there are two fairness principles that are often invoked in evaluating the tax system which have attracted widespread political and community support within Australia over an extended period of time. These are the benefit principle, which can be generalised as taxation being the price of living in civilised society, and the capacity to pay principle, which can be generalised as an individual's capacity to pay tax increasing as his or her income (or wealth) increases. The capacity to pay principle can be further defined by two key concepts: horizontal equity (the notion that it is fair that persons in the same situation should be equally treated) and vertical equity (the notion that those in different situations should be differently treated, with those more favorably placed required to pay more).

The tax outcomes of Individual 1 and 2 can be objectively judged as unfair on both a horizontal and vertical basis. Start with horizontal equity. As noted above, Australia's tax system is highly complex with different income tax rates applying to companies, individuals, and superannuation funds. This means that two individuals in the same economic position can achieve markedly different tax outcomes at any given point in their life course (and across generations).

The unfairness extends to comparisons of lifetime incomes, not just at one point in time. Individual 1 could follow the same lifetime income course as Individual 2. In which case, Individual 1 would have the ability to achieve the same asset mix that Individual 2 has currently. After extending the (strong) assumption that there is no change in tax policy settings in the intervening (say 45) years, they could then feasibly realise the same tax-free lifestyle. On this superficial basis, it suggests that the tax system achieves some level of horizontal equity. However, Individual 1 might happen to generate more of their income in ways that attract a higher rate of tax, such as wage and salary income, holding money in savings accounts, or investing outside superannuation. In which case it becomes clear that those with the same income path can shoulder different tax burdens. Horizontal equity is thus undermined.

Vertical equity principles are similarly undermined. Most obviously it is because people with lower current capacity to pay tax are paying more tax. But it also extends to considerations over a lifetime. This is because the future is, by definition, uncertain, and it's not clear that Individual 1 will enjoy the same income path as Individual 2. There are a range of reasons why people's income paths diverge, for example due to differences in (unobserved) abilities, different choices about investment (whether in financial or human capital), because of support received (whether by governments or through inheritances or other forms of private, family-driven assistance), motivations to invest in their capacity or take on high paying jobs, and sheer luck. In general a well-designed tax system will reward hard work and thrift but also provide some insurance against bad luck. The reality is that there is no real link between lifetime capacities, incomes and tax outcomes in Australia.

In a system so reliant on income taxation, the benefit principle can be undermined at the (somewhat extreme) point when people with high incomes are completely exempt from income tax. There are various points in life – such as early in life, when income levels are low and individuals might be investing in education, during periods of unemployment, due to sickness disability or later in life once one reaches retirement – where people's capacity to earn income might be impaired and thus their contributions to society might be anticipated to be low or zero (or a net recipient from other taxpayers). For some, these periods might extend across large portions of their lives.

However, it is hard to argue that those generating comfortable incomes through passive investment should not be making a contribution to the functioning of Australian society. The consideration becomes more acute when considering that, through the Australian dividend imputation system, these individuals are in the process of claiming full refunds on the taxes that the companies they invest in have

previously paid.[7] And outcomes can become corrosive to society if there is a section of the population with strong incentives to preserve and increase the benefits they receive from government, no stake in minimising the tax burden of financing such benefits, and who possess the capacity to focus intensively on resisting constructive policy change.

Less efficient

A system designed with a number of large tax-free thresholds on widely-held assets and income sources also imposes deadweight costs and detracts from the efficient allocation of economic resources. This has important labour market implications with fewer jobs, lower productivity and less wage growth.

Tax exemptions lead to a tax system that is high rate and narrow base, in direct opposition to the key learnings from the optimal tax literature. It should be noted that a chief argument for tax-free thresholds is that they reduce the degree of 'churn' in the tax and transfer system, wherein welfare recipients both pay taxes (whether personal, on housing or through retirement incomes) and receive income support payments such as unemployment assistance or the old-age pension. Carling (2016) observes that a highly targeted welfare system with means testing has the potential to reduce instances of the sorts of extremely high effective tax rates that come as a result of tax-transfer system interactions (typically displacing high rates to a different income level).

However, this comes at a high fiscal and economic cost. Tax-free thresholds that aren't targeted (and in the extreme case of owner-occupied housing, uncapped and not linked with pension assets tests) result in significant revenue leakage, as a large population of adults – combining those with high and low capacity to pay tax – all benefit. They impose economic costs from the higher statutory tax rates (and associated deadweight loss) that must be imposed on the taxpaying population in order for tax authorities to be able to 'make up' for the foregone revenue.

Tax is also a material consideration into decision making. A relatively extensive literature (which is also growing as administrative taxation data becomes more accessible) points to taxpayers' propensity to respond to tax incentives. International studies such as Feldstein (1999), Saez (2010) and Kleven (2016) and Australian-focussed studies such as Breunig and Johnson (2016) observe that the bigger the difference in marginal rates, the greater the tendency for taxpayers to structure their affairs, and that those with more flexible forms of income have a higher propensity to respond to incentives. Wages are a less flexible form of income and opportunities to reduce marginal rates are less for wage earners.

The mix of investment choices within Australia suggests that Australians have in aggregate responded to the tax-free status of key investment choices. In 2017-18, more than 70 per cent of Australians' net worth was invested into housing and superannuation (ABS 2019). Noteworthy is that housing has remained relatively steady since 2000, while the share of assets housed within superannuation has grown significantly.

7 The core idea behind dividend imputation, that individuals should pay tax at their marginal rate, may be sound but when combined with the tax-free status of so much other income and wealth it is corrosive to fairness.

Such an asset mix is suggestive that Australia's tax settings are a prominent part of a broader public policy landscape that is biasing people's – and firm's – lifetime decisions towards investing in particular domestic asset classes. In the process, the tax system is detracting from the efficient allocation of economic resources. In the media and around the world, there have been many calls for reduced globalisation in response to COVID-19. Some have suggested that production which has been offshored should be moved back onshore and that less trade and movement of people might be desirable. While we disagree with these sentiments, they are gaining traction. If a post-COVID-19 world triggers a prolonged decline in international capital mobility, such a shortcoming of the system will take on greater importance.

Imposing a broad-based and neutral tax regime that takes place from the first dollar of income (with appropriate compensation for low-income earners and retirees with low-asset levels) would carry the prospect of generating much more revenue with fewer distortions and could facilitate low economy-wide tax rates. Varela, Breunig and Sobeck (2020), for example, find that a flat capital tax rate of 6-7 per cent would raise a similar amount of revenue to what is currently being collected through capital, if it were to be applied uniformly on all sources of capital including housing, superannuation, equities and bonds. Such a change would actually produce a more progressive tax system compared to the current regime (which is regressive in practice).

More complex

The Individual 1 and Individual 2 scenario above is an exhibit of Australia's highly complex tax system. It shows how tax outcomes depend on specific individual and family circumstances, such as age, type of employment relationship, marital status, or the presence of adult children in the household. This is part of the reason approximately three quarters of Australian taxpayers engage tax agents to manage their tax affairs (ATO 2019b). An increasing number of artificial arrangements and legal fictions are also being established to deal with increasingly complex tax laws.

The different tax rates, vehicles, and variety of opportunities also add up to a tax code that is a nightmare to administer, particularly for a tax administrator trying to direct finite resources to ensure effective compliance. The system requires constant adjustment and legislative change.

Yet as the 2020 decision measure to allow the early release of up to $20,000 in superannuation[8] has revealed, incremental changes to specific parts of the tax system are now fraught with risk.

The early withdrawal measure was designed to allow eligible individuals affected by COVID-19 access to up to $10,000 of their superannuation in the last three months of the 2019-20 income year, and if eligible, to apply for another $10,000 in the first three months of the 2020-21 income year (Commonwealth of Australia 2020b). Notably, eligibility was defined by the level of financial impact from the coronavirus: being unemployed; being eligible to receive one of a small number of unemployment assistance payments; or a) being made redundant, b) having hours reduced by 20 per

8 See Commonwealth of Australia (2020a).

cent or more, or c) being a sole trader whose business was suspended or there was a reduction in turnover of 20 per cent or more.

With eligibility defined by financial impact, no constraints were placed upon an individual's capacity to absorb the financial impact and no constraints were placed on their ability to contribute back to superannuation through salary sacrifice arrangements in the same financial year that they withdrew from superannuation. As a result, a tax arbitrage opportunity was created (Breunig and Sainsbury 2020). The application process involved only limited checks to substantiate claims, and the ATO waited until June 2020 to issue comprehensive guidance around the conditions for access for the new program (ATO 2020c). Given these preconditions, it was unsurprising that a survey of withdrawal behavior suggested that up to 40 per cent of those withdrawing superannuation had either no decrease in income or had received government benefits to cover any loss (Ryan 2020). A succession of media reports since the scheme was announced, documenting that a substantial number of ineligible applicants were withdrawing from superannuation and a significant number of younger people withdrawing the entire balance of their superannuation funds, have been similarly unsurprising (e.g. Jolly 2020).

What at face value is a relatively modest change to enable working-age individuals to access a limited sum of their retirement savings over a six-month period has, as at 21 June, seen in excess of 2 million applications withdrawing more than $17 billion (APRA 2020). It is having broader knock-on implications for the financial system, undermining personal income tax collections, and altering the dynamic between the private and public retirement income streams for a significant share of the Australian population. It is quickly becoming a cautionary tale that incremental, piecemeal change in the Australian tax system has significant unintended consequences. The only enduring way forward for the Australian tax system will be comprehensive reform based on common principles.

Discussion

Is now different?

Slemrod and Bajika (2008) illustrate the challenging general task that tax reformers faced well when they invoked the plight of Hercules:

> *"who as penance for having killed his wife and children in a fit of madness, was given twelve tasks of immense difficulty. The fifth of these tasks was one of the most daunting of all – to clean, in one day, thirty years of accumulated manure left by thousands of cattle in the stables of Augeas. (The analogy to the tax system is, we fear, obvious). Hercules did not attempt to clean out the stables one shovelful at a time. Instead, Hercules diverted the rivers Alpheus and Peneus through the stables, ridding them of their filth at once."*

There is much to clean up in the Australian tax system, and the scale of change implied here does resemble a truly Herculean task.

That prospective task appears even more challenging considering that identifying and raising concerns around the efficiency, simplicity and fairness of the Australian tax system is not a particularly new practice. Such issues were neatly encapsulated by former Treasury Secretary Ken Henry, who, as part of 2018 remarks to the Australian Institute of Company Directors, noted that "tax reform is a decade overdue" (Henry 2018). Persuasive cases on the benefits of reform have fallen upon deaf political ears, notwithstanding the presence of a strong and detailed conceptual blueprint for tax reform in the form of the Henry Review.

Australia's increasing trend away from comprehensive change and towards incremental, piecemeal change in the past four decades does not inspire much confidence either. It is easy to become disillusioned at the prospect that future tax reform efforts, particularly ambitious and comprehensive reform, will ultimately prove dismal exercises.

There are two reasons to suspect that now might be a genuinely different context for tax reform. The first is that COVID-19 debt levels, combined with current structure of the Australian tax system, presents a strong rationale for change.

PwC (2020) and the Parliamentary Budget Office (2020) have outlined a scenario where, under reasonable assumptions, Commonwealth government public debt levels are expected to balloon, and where managing them presents as a generational challenge. What is particularly interesting is that these scenarios have been constructed partly based on an assumption that governments persist with the '2010s blueprint' of passive gradual fiscal repair through increased tax burdens on personal income taxpayers (through bracket creep) and companies.

The second stems from the uneven distribution of the consequences of COVID-19. The health and economic responses to COVID-19 were put in place to protect the entire population but they provide a disproportionate benefit to older populations that are more susceptible to the virus. At the same time, shutting down the economy has disproportionately affected working age Australians, and particularly the young in (or formerly in) casual employment. While much still needs to be analysed before a definitive statement can be made around the distributional consequences from a complex web of actions, it is likely that COVID-19 has already seen a significant intergenerational transfer from the current young and working age population towards current older Australians. The transfer becomes starker when considering that the younger generation will bear the heaviest burden of income taxation going forward.

These two reasons point to a potentially narrow window of political opportunity for comprehensive change. Comprehensive in the sense of the kinds of actions more akin to the diversion of rivers than to those that require a shovel. A well-articulated plan that places an increased tax burden on the holders of existing wealth, and a decreased tax burden on the working age taxpaying population may prove more socially acceptable now than it has been in recent decades. Crucially, this consideration also extends to the all-important debate about transitional arrangements that get from current to desired future systems, which can make or break tax reform efforts.

There are reasons to be cautious when expressing optimism, however. While there is a window of opportunity, there also needs to be the political willpower at

multiple levels of government to proceed with what will invariably be politically challenging and sensitive reforms. Compromise will be essential. It remains to be seen how wide or enduring this window of opportunity will prove to be. It also remains to be seen whether the Australian political system will be able to consign the early 2010s as a temporary aberration of stalled tax reform, or whether the post-COVID-19 years will prove as gridlocked as those in recent history.

Conclusion

In this article, we explained that Australia's tax system is heavily reliant on income taxation, and that Commonwealth revenue raising has become more concentrated on a narrowing band of high income taxpayers paying high tax rates. At the same time, there is a path towards zero tax outcomes for a significant range of income and assets which are being used by some Australians.

We have also pointed out the types of structural trends that are suggestive of an increasing reliance on high-earning personal income taxpayers into the future. When all major Commonwealth revenue sources are being eroded by a powerful cocktail of longer-term forces – including globalisation, technological advance, changing consumption trends and taxpayer arbitrage – it is right to ask questions about how sound and sustainable the tax system is.

The COVID-19 shock and associated public response has revealed that the Australian tax system needs reform to ensure it will continue to have the capacity to meet future calls on government. The key questions of interest are whether tax reform will occur sooner rather than later, and whether it will be in the form of comprehensive, coordinated reform rather than ad hoc, incremental change that is beholden to lobbying by special interests.

In our view, a public policy and structural reform priority should be placed on coordinated actions to amend the tax system in ways that reduce fiscal vulnerabilities and improve societal wellbeing. And an important aspect of such reform should be eliminating or dramatically curtailing the amount of economic activity that attracts tax-free status.

References

Asprey, K. and Parsons, R. (1975), Commonwealth Taxation Review Committee, Full Report January 31 1975. Available at http://adc.library.usyd.edu.au/data-2/p00087.pdf, accessed June 2020.

Australian Bureau of Statistics (ABS) (2019), *Survey of Income and Housing 2017-18*, Catalogue 6553.0, Australian Bureau of Statistics.

Australian Prudential Regulatory Authority (APRA) (2020), *COVID-19 Early Release Scheme – Issue 9*, 29 June. Australian Government: Canberra. Available at https://www.apra.gov.au/COVID-19-early-release-scheme-issue-9, accessed July 2020.

Australian Taxation Office (ATO) (2019a), *Report of entity tax information*, December. Available at https://www.ato.gov.au/Business/Large-business/In-detail/Tax-transparency/Tax-transparency--reporting-of-entity-tax-information/, accessed June 2020.

ATO (2019b), *Taxation Statistics 2016-17 – Individuals 100 People Statistics*. Australian Government: Canberra. Available at https://www.ato.gov.au/About-ATO/Research-andstatistics/In-detail/Taxation-statistics/Taxation-statistics-2016-17/?page=8, accessed June 2020.

ATO (2020a), *Lower taxes for hard-working Australians: Building on the Personal Income Tax Plan*. Australian Government: Canberra. Available at https://www.ato.gov.au/General/New-legislation/In-detail/Direct-taxes/Income-tax-for-individuals/Lower-taxes-for-hard-working-Australians--Building-on-the-Personal-Income-Tax-Plan/, accessed June 2020.

ATO (2020b), *Senior Australians*, Australian Government: Canberra. Available at https://www.ato.gov.au/Individuals/Income-and-deductions/Offsets-and-rebates/Senior-Australians/, accessed June 2020.

ATO (2020c), *COVID-19 early release of super – integrity and compliance*. Australian Government: Canberra. Available at https://www.ato.gov.au/Individuals/Super/In-detail/Withdrawing-and-using-your-super/COVID-19-Early-release-of-super---integrity-and-compliance/, accessed July 2020.

Australian Treasury (1999), *A Tax System Redesigned, More Certain, Equitable, and Durable*. Report. https://treasury.gov.au/review/review-of-business-taxation

Breunig, R. and Sainsbury, T. (2020), 'The Australian government opens a coronavirus super loophole: it's legal to put your money in, take it out, and save on tax', *The Conversation*, 1 April. Available at https://theconversation.com/the-australian-government-opens-a-coronavirus-super-loophole-its-legal-to-put-your-money-in-take-it-out-and-save-on-tax-135306, accessed June 2020.

Carling, R. (2016), *Taming the Monster: Reforming personal income tax*, Research Report, The Centre for Independent Studies, April. Available at https://www.cis.org.au/app/uploads/2016/03/rr12.pdf, accessed June 2020.

Chicago Booth (2019), 'Top Marginal Tax Rates' IGM Forum, 16 January. Available at http://www.igmchicago.org/surveys/top-marginal-tax-rates/, accessed June 2020.

Commonwealth of Australia (2009), *Review of Australia's Future Tax System*, Final Report. Available at https://taxreview.treasury.gov.au/Content/Content.aspx?doc=html/home.htm.

Commonwealth of Australia (2020a), *Economic response to the Coronavirus: Early Access to superannuation*, Factsheet, April. Available at https://treasury.gov.au/sites/default/files/2020-04/Fact_sheet-Early_Access_to_Super.pdf, accessed June 2020.

Commonwealth of Australia (2020b), *Economic response to the Coronavirus*. Factsheet, April. Available at https://treasury.gov.au/sites/default/files/2020-05/Overview-Economic_Response_to_the_Coronavirus_3.pdf, accessed June 2020.

Davis, G., Akroyd, P., Pearl, D. and Sainsbury, T. (2019), *Recent personal income tax progressivity trends in Australia*, Treasury Working Paper 2019-05, September. Available at https://treasury.gov.au/sites/default/files/2019-09/p2019-t396438.pdf, accessed June 2020.

Feldstein, M. (1999), "Tax avoidance and the deadweight loss of the income tax", Review of Economics and Statistics 81, 4, November, pp. 674–680. Available at https://www.jstor.org/stable/2646716?seq=1, accessed June 2020.

Frydenberg, J. and Cormann, M. (2020), Mid-Year Economic and Fiscal Outlook 2019-20. Commonwealth of Australia: Canberra, December. Available at https://budget.gov.au/2019- 20/content/myefo/index.htm, accessed June 2020.

Haig, Robert M. (1921), "The Concept of Income—Economic and Legal Aspects" The Federal Income Tax. New York: Columbia University Press, 1-28.

Henry, K. (2018), 'NAB Chairman Dr Ken Henry AC – speech to the AICD Governance Summit, 2 March. Available at https://news.nab.com.au/nab-chairman-dr-ken-henry-ac-speech-to-the-aicd-governance-summit/, accessed June 2020.

International Monetary Fund (2020), 'Policy Responses to COVID-19: Policy Tracker', International Monetary Fund, Washington D.C. Available at https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19, accessed June 2020.

Johnson, S. and Breunig, R. (2016), 'Taxpayer responsiveness to marginal tax rates: bunching evidence from the Australian Personal income tax system', speech to The 29th PhD Conference in Economics and Business, The University of Western Australia, 10 November. Available at http://www.business.uwa.edu.au/__data/assets/pdf_file/0006/2937822/160927-Shane-Johnson-bunching.pdf, accessed June 2020.

Jolly, W. (2020), Nearly 400,000 young Australians have drained their super, Savings.com.au, 2 July. Available at https://www.savings.com.au/savings-accounts/nearly-400-000-young-australians-have-drained-their-super, accessed July 2020.

Karp, P. (2020), Australia's Treasury chief say government should worry about jobs and not rising debt during coronavirus crisis, *The Guardian*, 21 May. Available at https://www.theguardian.com/business/2020/may/21/australias-treasury-chief-says-government-should-worry-about-jobs-and-not-rising-debt-during-coronavirus-crisis, accessed June 2020.

Kleven, H. (2016), "Bunching", *Annual Review of Economics* 8, 435-464. Available at https://www.annualreviews.org/doi/abs/10.1146/annurev-economics-080315-015234, accessed June 2020.

Konow, J. (2003), "Which Is the Fairest One of All? A Positive Analysis of Justice Theories." *Journal of Economic Literature* 41, 4:1188-1239. Available at http://www.its.caltech.edu/~squartz/justice.pdf, accessed June 2020.

Mankiw, G., Wienzierl, M. and Yagan, D. (2009), "Optimal Taxation in Theory and Practice", *Journal of Economic Perspectives* 23, 4: 147–174. Available at https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.23.4.147, accessed June 2020.

Mirrlees, James A. 1971. "An Exploration in the Theory of Optimal Income Taxation." *Review of Economic Studies*, 38(114): 175–208. Available at https://www.jstor.org/stable/2296779?seq=1, accessed June 2020.

Parliamentary Budget Office (2018), *Trends affecting the sustainability of Commonwealth Taxes*, Report no.02/2018, July. Available at https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Budget_Office/Publications/Research_reports/Trends_affecting_the_sustainability_of_Commonwealth_taxes, accessed June 2020.

Parliamentary Budget Office (2020), *Medium-term fiscal projection scenarios: impact of COVID-19 pandemic and response*, 5 June. Available at file:///C:/Users/triss/Downloads/Medium-term%20fiscal%20projection%20scenarios%20-%20impact%20of%20COVID-19%20pandemic%20and%20response%20pdf%20(5).pdf, accessed June 2020.

Piketty, T., Saez, E. and Stantcheva, S. (2014), "Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities", *American Economic Journal: Economic Policy* 2014, 6(1): 230–271. Available at https://eml.berkeley.edu/~saez/piketty-saez-stantchevaAEJ14.pdf, accessed June 2020.

PwC (2020), *Where next for Australia's tax system? How our tax system can help reboot prosperity for Australia*, June. Available at https://www.pwc.com.au/tax/assets/tax-reform/2020/where-next-for-australias-tax-system-june2020.pdf, access June 2020.

Ramsey, F. (1927), "A Contribution to the Theory of Taxation." *Economic Journal*, 37: 47–61. Available at https://www.jstor.org/stable/pdf/2222721.pdf?seq=1, accessed June 2020.

Ryan, P. (2020), *Superannuation withdrawals spent on gambling, alcohol, takeaway food: report*, ABC News, 1 June. Available at https://www.abc.net.au/news/2020-06-01/superannuation-withdrawals-spent-on-gambling-alcohol-takeaway/12306710, accessed June 2020.

Saez, E. (2010), "Do taxpayers bunch at kink points?". *American Economic Journal: Economic Policy*, Volume 2, Number 3, pp. 180–212

Sainsbury, T. and Breunig, R. (2020), *The Australian Tax Planning Playbook: Volume 1*, Tax and Transfer Policy Institute Working Paper 1/2020, March. Available at https://taxpolicy.crawford.anu.edu.au/sites/default/files/publication/taxstudies_crawford_anu_edu_au/2020-03/complete_sainsbury_breunig_wp1_mar_2020.pdf, accessed June 2020.

Schanz, G. (1896), "Der Einkommensbegriff und die Einkommensteuergesetze". Finanzarchiv. 13: 1–87.

Simons, H. (1938), *Personal Income Taxation: the Definition of Income as a Problem of Fiscal Policy*. University of Chicago Press: Chicago, p. 49.

Slemrod, J. and Bakija, J. (2008), *Taxing Ourselves: A Citizen's Guide to the Debate over Taxes*, Fourth Edition. Massachusetts Institute of Technology Press: Cambridge, p. 308.

Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*, Books I, II, III, IV and V, The Glasgow Edition of the Works and Correspondence of Adam Smith, Second Edition. Available at https://www.ibiblio.org/ml/libri/s/SmithA_WealthNations_p.pdf, accessed June 2020.

Summers, L. (1981), *Capital Taxation and Accumulation in a Life Cycle Growth Model*, The American Economic Review, 71, 4, pp. 533-544. Available at https://www.jstor.org/stable/1806179?seq=1, accessed June 2020.

Tax and Transfer Policy Institute (TTPI) (2018), Principles of Tax System Design, Tax Fact #1, Tax and Transfer Policy Institute, Canberra. Available at https://taxpolicy.crawford.anu.edu.au/sites/default/files/uploads/taxstudies_crawford_anu_edu_au/2019-04/tax_fact_1_2018_0_edited_2019.pdf, accessed June 2020.

Tuomala, M. (1990), *Optimal Income Tax and Redistribution*, New York: Oxford University Press.

Varela, P., Breunig, R., Sobeck, K. (2020), *The Taxation of savings in Australia: Theory, current practice and future policy directions*, Tax and Transfer Policy Institute (TTPI) Policy Report No. 01-2020, Canberra, Australia.

The Proposed Job-ready Graduate Package: a misguided arrow missing its target

Anne Daly and Phil Lewis Centre for Labour Market Research,
University of Canberra

Abstract

In June 2020 the Minister for Education, Dan Tehan announced the Job-ready Graduate Package which aimed to provide the price signals the Coalition Government believes are necessary to generate the skills required in the Australian labour market in the post-COVID-19 world. This paper uses existing evidence to argue that the proposed Job-ready Graduate Package is likely to miss its mark, crucially with respect to having a medium-term impact on student choice. The paper draws on evidence of employment patterns of new graduates and established graduates in the Australian labour market to assess the economic argument that certain degree disciplines are more 'job ready' than others; the rationale behind 'picking winners' and the economic case for the proposed funding structure. The evidence from previous changes in the HECS/HELP rates, which were not as large as the proposed ones, suggests that they are unlikely to have a significant effect on student choices. This is not surprising given the wide range of factors that influence choice of discipline including student preferences, educational background, the employment and income of existing graduates, socio-economic background, career guidance and school experience, occupational expectations, psychological attributes and university entrance scores. The idea of 'picking winners' among disciplines for study to generate 'job-ready' graduates faces many difficulties in the uncertain post-COVID-19 world against a background of long-term changes in the economic structure of the economy. Working lives can last for over 40 years and people can move between occupations, adapting skills and retraining over time. Individuals are best placed to make these choices for themselves rather than relying on government direction.

JEL Codes: I26, I28, J24
Keywords: Rates of return, higher education, job-ready, picking winners

Introduction

In June 2020, in the context of the COVID-19 pandemic, the Minister for Education, Dan Tehan, announced the Job-ready Graduate Package aimed at focusing public investment in higher education on national priorities and on promoting the benefit of students, industry and the community. The overall proposed package is designed to be budget-neutral (Peetz 2020a) and is supposed to address the rising demand for places which is expected with the COVID-19 recession (Norton 2020).

There has been a long history of Australian government support for universities but the trend in the last 30 years has been toward reducing that support from the high point of free university places for students, introduced by the Whitlam government in 1974. The current government support takes the form of direct payments to universities, support for students in the payment of their fees and loans for living expenses, and research grants.

The students' contribution to the cost of their education has grown over time. A small user payment was first introduced in 1989 in the form of an income contingent loan, the Higher Education Contribution Scheme (HECS) which has increased as a proportion of the costs of a degree and is now differentiated by type of degree (to be further discussed below) (for further background see Jackson 2003, Chapman and Ryan 2005). In addition, the Australian government provides direct funding support to universities through Commonwealth Supported Places (CSP) although the real value of that funding has declined over time and the universities have become increasingly dependent on income from overseas students.

In 2018-2019 there were 189,477 international tertiary student visas issued and in January 2019, 267,055 international tertiary enrolments (students can be enrolled in more than one course) (DESE 2020b). Before the current COVID-19 pandemic, direct Australian government support accounted for about 40 per cent of university income (OECD 2019). As the number of international students able to study in Australia in 2020 has declined dramatically, the universities have been left with large holes in their budgets and a problem requiring immediate attention by all stakeholders.

The most recent proposal for change from the Coalition government, the Job-ready Graduate Package (DESE 2020a), covers support for university teaching while the other major university activity, research, will continue to be funded through the Australian Research Council (ARC) and the National Health and Medical Research Council (NH&MRC). This proposal must be approved by the Parliament for introduction in 2021 and may be contentious in the Senate.

This paper outlines the major components of the proposed changes and uses evidence from earlier research to assess the possible implications of the introduction of the Job-ready Graduate Package if it were to be implemented in its current form. The paper draws on evidence of employment patterns of new graduates and established graduates in the Australian labour market to assess the economic argument that certain degree disciplines are more 'job ready' than others; the rationale behind 'picking winners' and the economic case for the proposed funding structure.

Outline of the Proposal

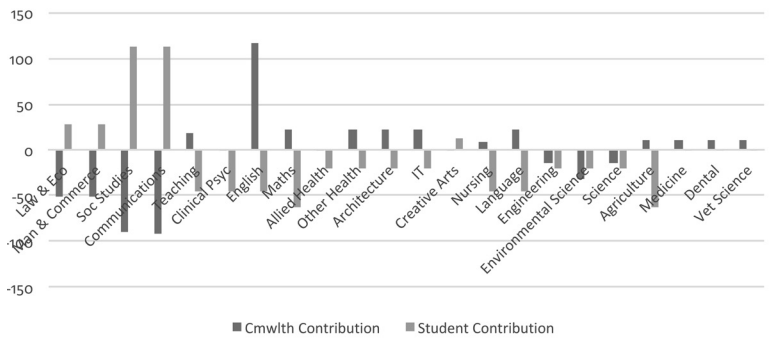
The Job-ready Graduate Package states –

> *'The changes aim to deliver more job-ready graduates in the disciplines and regions where they are needed most and help drive the nation's economic recovery from the COVID-19 pandemic'* (DESE 2020c)

There are a number of components to the proposed changes which aim to use price signals to both the universities and potential students to influence their choices of degrees offered or undertaken. The funds going directly to the universities for CSPs will reflect the cost of delivering courses and the HECS/HELP fees to students are designed to encourage students to undertake the courses which are most likely to promote good labour market outcomes for graduates and promote those skills predicted to be in demand in the post-COVID-19 world including nursing, health occupations, teaching and information technology (IT).

The number of disciplinary funding clusters for CSPs will be reduced from eight to four. Direct funding to the universities will be reduced to $1100 per student for Law, Economics, Management, Commerce, Social Studies, Political Science, Behavioural Science and Communications and increased to $27,000 for Agriculture, Medicine, Veterinary Science and Dentistry (projected 2021 rates). The comparison between the current level of CSP funding and the proposed new levels is presented in Figure 1. The disciplines in the new lowest funding cluster will face the largest reduction in CSP support in addition to reductions in Engineering and Environmental Science. English will experience the largest growth in funding.

Figure 1: Proposed % change in Commonwealth and Student Contributions



Source: DESE (2020a)

In addition, there will be more CSPs, 39,000 places in 2023, growing to 100,000 by 2030 to address the expected increase in demand for places arising from

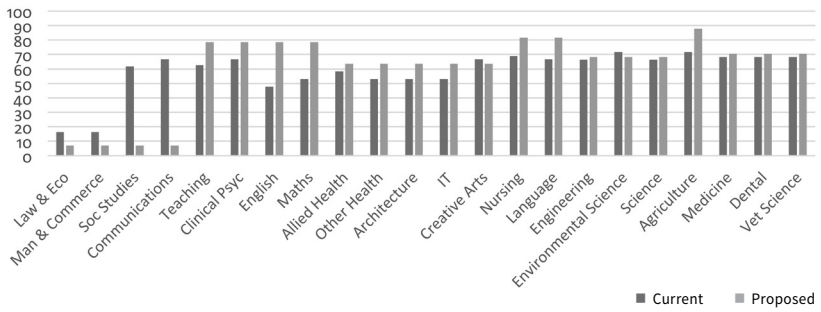
the COVID-19 recession and demographic factors, the so-called 'Costello baby boom'. There will be a funding envelope indexed to the CPI. Universities will be able to transfer funding between disciplines (except medicine) and degree level (undergraduate and postgraduate) as long as the changes are cost neutral. There will be additional funding from 2021 for universities in regional Australia and fast-growing metropolitan areas; an additional 3.5 per cent for regional campuses; 2.5 per cent for campuses in high growth metropolitan areas and 1 per cent for campuses in low growth metropolitan areas.

In order to further promote the vocational and regional aspects of higher education, there will be two funds established. The National Priority and Industry Linkage Fund (NPILF) will promote vocationally-orientated teaching and work experience. The second fund, the Indigenous, Regional and Low SES Attainment Fund (IRLSAF) will support students from the backgrounds listed in its title. In line with the promotion of regional campuses, there is a proposal to further develop research in these locations. There will also be support to promote online 'microcredentials'.

There are also significant changes proposed to the cost to students via HECS/HELP of individual degrees. The number of clusters has been increased from three to four. Law, Economics, Management, Commerce, Social Studies, Political Science, Behavioural Science and Communications students can expect to pay $14,500 for each year of study while the lowest rate of $3,700 per year will be charged to the Teaching, Clinical Psychology, English, Mathematics and Agriculture disciplines. Figure 1 shows that the largest increases proposed are for the disciplines of Social Studies, Political Science, Behavioural Science and Communications and the largest decreases for Mathematics and Agriculture. As identified by Bond-Smith and Cassells (2020), the impact of these changes will fall more heavily on women, who make up 60 per cent of the current student population, than men because of their existing preferences for humanities and the social sciences over STEM disciplines. In addition to these changes in the HECS/HELP fees future students might be expected to pay, there are proposed schemes to enable regional students to relocate for educational purposes and to encourage Indigenous students to attend their university of choice.

Figure 2 summarises the share of total revenue received by universities and incurred as costs by the Australian government (making the bold but empirically false, assumption that all the income contingent loans are repaid. See further discussion of this point below). An increase in the proposed Commonwealth contribution and a reduction in the student contribution results in an increase in the Commonwealth's share of the total contribution to universities for a given discipline. The largest changes in the proposed share of Commonwealth contributions in the total costs are for the disciplines of Social Studies, Political Science, Behavioural Science and Communications where the share is expected to fall from over 60 per cent to 7 per cent. In contrast, there will be increases in the Commonwealth contribution in the disciplines of English (64 per cent), Mathematics (47 per cent), Languages (23 per cent) and Agriculture (23 per cent).

Figure 2: Share of Commonweatlh Contribution in Total %



Source: DESE (2020a)

What is the evidence?

This section will consider available evidence relevant to the proposal's aim of promoting 'job-ready' graduates in relevant disciplines and regions for the post-COVID-19 economy. It begins by comparing the available public evidence on the cost of providing tertiary education for different disciplines as presented in Deloitte (2016) and the proposed total payment to universities.

One aim of the Job-ready Graduate Package is to provide incentives for the universities to shift the mix of disciplines in which they offer places towards those favoured by the Coalition government. Deloitte (2016) uses 2015 data derived from 17 universities, half the sector's enrolments, and presents estimates of median and mean costs based on raw data and employs three methodologies to estimate 'reasonable' costs across a range of disciplines. The report emphasises that costs per student in a given discipline can differ substantially between institutions for legitimate reasons and are particularly influenced by staff/student ratios and the share of casual teaching staff employed. In addition, universities supply both teaching and research and the allocation of costs between these two outputs, which are often considered as joint products, is complex (see Norton 2015 for a discussion of the cross-subsidisation of research by teaching income in Australian universities). The report summarises costs per student according to a range of measures, some based on raw data and some estimated (see Deloitte 2016:69). The absolute levels of costs differ by measure but the ranking remains similar between them all. Veterinary Science and Dental Studies were reported to have the highest costs and Education, Management and Commerce, Other Social and Cultural (excluding Psychology), Communications and Media the lowest. The rankings were similar to those reported in an earlier study by Deloitte using 2010 data. They also concluded that postgraduate costs exceeded undergraduate ones.

On the basis of the median raw cost data adjusted to 2019 prices and compared with the proposed total income from the Job-ready Graduate Package (CSP and student

contributions)[1], universities will have an incentive to expand Mathematics, Engineering, Environmental Science, Science and Agriculture where costs were below the proposed total income. In contrast Law and Economics, Management and Commerce, English, Nursing, Creative Arts and Allied Health will offer low or negative margins. Dental Studies and Veterinary Science continue to be expensive courses to run and places in Medicine will not be determined by individual universities. These calculations, based on the median raw costs presented by Deloitte (2016), are indicative and the experience of individual institutions may differ. They do however suggest that apart from possibly Nursing and Allied Health, the incentives for the average institution are likely to encourage expansion in the disciplines the Coalition government is keen to promote (see Bond-Smith and Cassells 2020 for similar calculations based on different assumptions).

There is, however, no discussion in the proposal of any future role for international students in the Australian university sector. While the number of these students is unlikely to return to the levels seen in 2019 for some time, if ever, their existing preferences for the disciplines of Management and Commerce and IT and the profitability of offering these courses could influence the universities' choices of disciplinary mix in favour of these two areas. The role of international students' fees in financing university research is another reason why universities may continue to offer Management and Commerce degrees as a means of attracting international students to their institution. In addition, universities are unlikely to expand the number of places in courses for which there is limited demand even if the financial incentives offered by the government would encourage them to do so.

One component of the package, the NPILF, will provide incentives for universities to promote work experience among students. Over the past decade, many universities have increased the opportunities for students to gain labour market experience through Work-Integrated Learning (WIL) programs with the aim of giving their graduates an advantage when entering the labour market. Jackson and Collings (2017) used a sample of domestic students from a Western Australian university to study the effects of WIL and paid employment on the employment outcomes of graduates. They found no evidence that participation in WIL units was associated with higher full-time employment. However, employment in the final year of study was associated with higher full-time employment of graduates in both the short and long term.

The second aim of the Job-ready Graduate Package is to encourage students to undertake study in disciplines that the government sees as being vocationally relevant in the post-COVID-19 economy. The size of the HECS/HELP contribution is only one component of a student's decision on choice of discipline. Student preferences, educational background and the employment and income of existing graduates is likely to also contribute to the decision on choice of discipline. Studies have shown

1 The list of disciplines reported in the Deloitte study does not match that used in the Job-ready Graduate Package. Specifically, the following categories for median costs were applied – other Science for Science, Medical Science for Allied Health and Nursing, Other Creative Arts for Creative Arts, Other Society and Culture for Law and Economics; Social Studies, and English.

that factors including socio-economic background, career guidance and school experience, occupational expectations, psychological attributes as well as university entrance scores all influence the decision to go to university and the course chosen by students (Marks *et al*. 2001, Tomaszewki *et al*. 2020, Law 2020, Parker 2020).

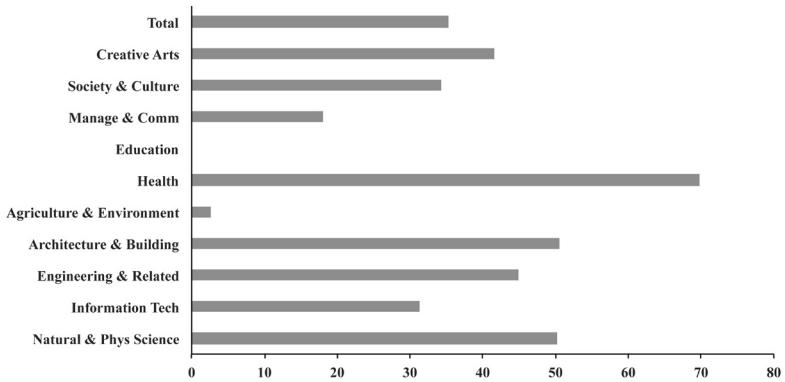
Outcomes for current graduates are also likely to be relevant in choice of discipline to study. The medium-term implications of the pandemic for employment and the demand for particular skills is hard to predict but the evidence from the recent experience of graduates is likely to remain relevant. The following presents evidence on employment and income for new graduates, taken from Quality Indicators for Learning and Teaching (QUILT 2020) and for all graduates from the 2016 Census of Population. Prior to the onset of the COVID-19 pandemic, there was already evidence that the labour market for workers under 35 years of age in Australia was not as robust as it had been a decade earlier before the Global Financial Crisis (GFC) (Productivity Commission 2020).

Corliss, Daly and Lewis (2020) reported that between 2001 and 2016 the number of bachelor completions had risen by 43.2 per cent and of that 30.1 percentage points of the rise was between 2006 and 2016. DESE (2020d) reports an increase in bachelor completions of 35 per cent between 2008 and 2018, the latest year for which published data are available. Such a big increase in the number of new graduates entering the labour market during a period of slow to modest growth in employment (Lewis 2015) would have been expected to have a significant impact on graduate employment and earnings. In addition, there was evidence of reduced demand for graduates (see also Productivity Commission 2020).

Interestingly, the increase in bachelor graduations was not evenly distributed across disciplines as indicated in Figure 3 which shows the growth between 2008 and 2018 by broad field of study. The biggest percentage increase was in Health, while above average percentage increases were observed for STEM subjects – Science, Engineering and for Creative Arts and Architecture. Education completions actually fell slightly while growth rates for Management and Commerce, Agriculture and Environmental Science and IT were below average. The existing increases in Health, STEM and Architecture were in line with the current government proposal but the declines in Agriculture and Environmental Science, IT and Education and the expansion of Creative Arts were opposite to the proposed changes in these disciplines.

The growth in graduates seems only partly to reflect changes in labour market demand. For instance, while the growth in health professionals accords with the growth in demand for personal services and projected growth in the health sector (Lewis 2015), the second biggest growth rate was in Creative Arts, an area yielding the poorest economic rewards for graduates (to be discussed in more detail below, see Corliss, Daly and Lewis 2020). The growth in Creative Arts graduates may well be due to the deterioration in the labour market for graduates generally whereby, as the career prospects of taking a more "career focussed" area of study diminishes, those degrees that have a high consumption good element experience an increase in demand (Lewis and Lee 2020).

Figure 3: Completions of bachelor degrees by broad field of study, percentage change, 2008-2018



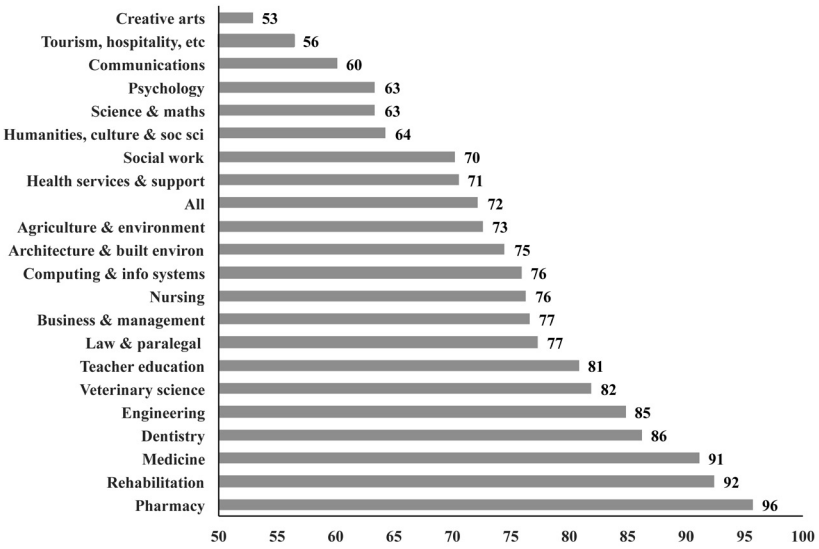
Source: Department of Education, Skills and Employment (DESE 2020d), uCube, Higher Education Data.

When differential HECS rates by discipline were introduced in 1997, Education and Nursing were declared areas of 'National Priority' and had the lowest HECS rates. The evidence presented here suggests that the low HECS rate for Education was not a sufficient attraction to students to move to this discipline.

Corliss, Daly and Lewis (2020) demonstrated that the number of undergraduate degree completions soared in the wake of the GFC of 2007 as the jobs market became slack and investment in a university education became more attractive. They also found that after the economic contraction following the GFC and the huge expansion in university graduates, the percentage of new graduates obtaining a full-time job fell from 80 per cent almost continuously each year until reaching a low of 68 per cent in 2014. There were some small signs of recovery thereafter but not to the 'boom' levels of 2006 or the 'normal' levels observed before then. Graduate starting salaries fell by over 14 per cent for males and 11 per cent for females in real terms between 2007 and 2014. It is probable that the impact on the market for new graduates of COVID-19 will be as great or even greater than that of the GFC.

Figures 4 and 5 present the most recent evidence from the Graduate Outcomes Survey (GOS) of the employment and starting salaries of new graduates for 2018. There has been a deterioration in both these indicators in recent years (Corliss, Daly and Lewis 2020).

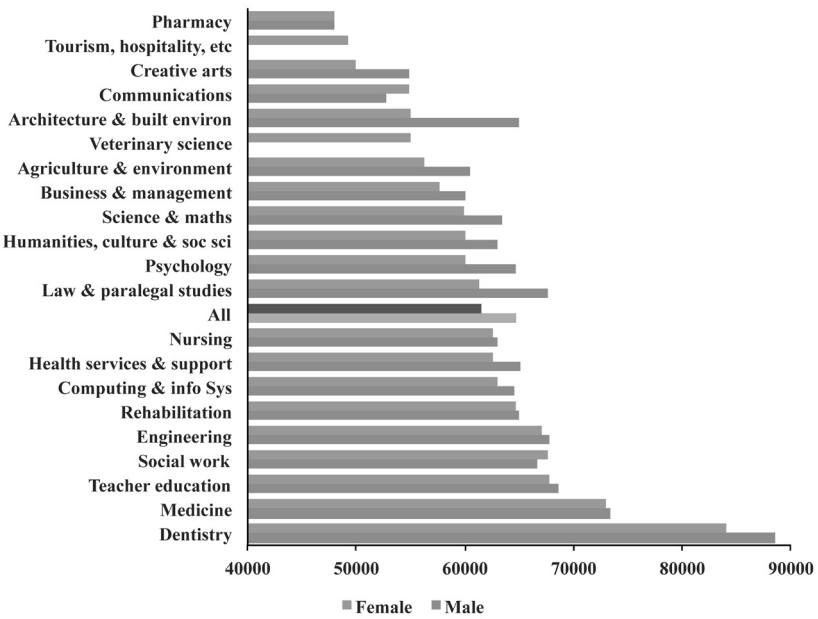
Figure 4: New bachelor graduates in full-time employment as a percentage of all wanting full-time employment, per cent by field of study, 2018



Source: Quality Indicators for Learning and Teaching, (QILT, 2020)

The overall employment and salary conditions of all university bachelor graduates masks somewhat the differences between graduates according to field of study. Teacher Education, Dentistry, Rehabilitation, Veterinary Science, Engineering, Pharmacy and Medicine had a full-time employment rate of 80 per cent or better in 2018. By contrast, as shown in Figure 4, the fields of Creative Arts, Communications, Humanities, Science and Maths, Culture and Social Sciences and Psychology had full-time employment figures about or lower than 65 per cent.

Figure 5: Median starting salaries of new graduates by field of study, $, 2018



Source: Quality Indicators for Learning and Teaching, (QILT, 2020)
Note: For Vet Science and Tourism etc. there were insufficient observations to calculate a reliable median.

Figure 5 presents data on starting salaries by discipline. In 2018 graduates in Dentistry had by far the biggest starting salaries (median $88,500), while other fields of study with above median starting salaries (in the $61,000-$75,000 band) were Medicine, Nursing, Education, Engineering, Computing and Information Systems, Law and Paralegal Studies, Rehabilitation and Psychology. Study areas with particularly low levels of earnings were Communications, Creative Arts and Pharmacy. The relatively low starting salary for Pharmacy is largely explained by the requirement that graduates must meet additional training requirements in order to gain professional registration.

In summary, many of the disciplines that the Coalition government is keen to promote in its Job-ready Graduate Package such as Engineering, IT and Education had above average performance in terms of both employment and starting salaries in 2018 but other disciplines such as Agriculture and Environmental Studies, and Science and Mathematics performed poorly on these indicators. Tourism etc., Communications and Creative Arts, all disciplines the current proposal aims to deter students from undertaking, had relatively low starting salaries and high unemployment rates.

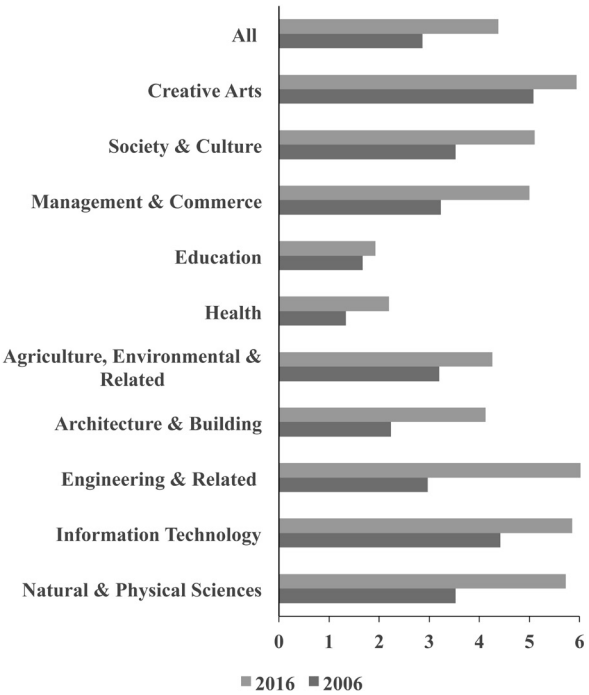
One of the major shortcomings of the GOS and its forerunner the Graduate Destination Survey (GDS) is that it only examines the employment situation very shortly (about four months) after graduation which is a relatively short period in which

graduates can enter into full-time employment. However, in the GOS Longitudinal (GOS-L) a sample of those in the survey after graduation is surveyed three years later. The survey finds that employment and salaries had improved, as expected, three years after graduation.

Given the limitation of the GDS/GOS, here we examine Census data on unemployment rates for all graduates. Although the most recent Census data are for 2016, they are likely to provide a reasonable description of the state of the labour market for graduates pre-COVID-19. The use of data spanning the whole working life of graduates is likely to give a better picture of the adequacy of different degrees for the labour market than a very narrow 'jobs ready' approach looking only at new graduates.

Of course, the labour market experience of new graduates may differ from that of graduates as a whole. For instance, it may be difficult for new graduates to find their first full-time job, and that job may be relatively low paid, but the rest of their career might be quite successful in gaining a premium for having had a university education. However, an examination of Census data indicates that unemployment among new graduates was quite persistent affecting graduates quite some time after graduation (see Corliss, Daly and Lewis 2020 for a more detailed examination of unemployment among graduates under 30 years of age).

Figure 6: Unemployment rates for all bachelor graduates by discipline of degree, 2006 and 2016, per cent



Source: Corliss, Daly and Lewis (2020) based on Census of Population and Housing data, 2006 and 2016, unpublished.

Figure 6 demonstrates that the unemployment rate for bachelor graduates as a whole (of all ages) rose between 2006 and 2016. The reasons for this are open to conjecture but the explanation is probably found both on the supply side, increased numbers of new domestic graduates, increased numbers of skilled migrants and, on the demand side, the lower rates of economic growth over the period in question.

In 2006 the unemployment rate of all those holding a bachelor degree was 2.8 per cent compared to the national rate of unemployment of 4.8 per cent. By 2016 the comparative figures for all bachelor graduates and for the workforce as a whole were, respectively, 4.4 and 5.7 per cent. A university degree still reduced the probability of unemployment for graduates, but it did not make a graduate immune to the effects of the business cycle.

The most recent data for May 2020 from the Labour Force Survey conducted by ABS show that while graduate employment has been affected by the COVID-19 lockdown, the falls have been smaller than for those without a tertiary qualification. As current unemployment figures are difficult to interpret given the range of government programs such as JobKeeper aimed at keeping workers connected to their employers,

the figures presented in Table 1 compare the employment population (E/P) ratio for 2019 with E/P for full and part-time workers in May 2020. They show that the falls in employment for both part-time and full-time graduates at this point in the post-COVID-19 world were smaller than for those without a tertiary qualification.

Table 1: Employment/Population Ratio for Tertiary Graduates compared with non-Graduates, aged 15+, 2019 and May 2020

	Graduates[a.]		*No tertiary qualification*	
	Full-time	*Part-time*	*Full-time*	*Part-time*
2019	0.57	0.21	0.37	0.20
May 2020	0.56	0.19	0.35	0.17
% change	-3	-7	-5	-13

Source: ABS (2020) *Labour force survey*, cat no.6202.0
Note a. Graduates include post-graduates and those with a bachelor degree.

Two main conclusions can be drawn from the above analysis. First, general downturns in the economy affect employment of graduates in all disciplines. Second, graduates in some disciplines have been particularly affected by changes in the structure of demand and supply in the labour market and as a result of structural and technological change in the Australian economy (see, for instance, Kelly and Lewis 2010, Lewis 2015, Borland and Coelli 2017, Peetz and Murray 2019). There has been a relatively strong increase in demand, relative to supply, of graduates in Health care and Education and relatively weak increases for graduates in STEM subjects such as Engineering, Information Technology and Science. Interestingly, Creative Arts graduates, who experience higher average rates of unemployment have been least affected and experienced the smallest increase in unemployment rates. In fact, Lewis and Lee (2020), using a number of measures show that the labour market for Creative Arts (as well as Humanities) graduates in Australia has improved markedly over two decades.

Unemployment is only one measure of labour market 'match' of supply and demand. A more comprehensive measure is the rate of return to a university degree which takes into account both the costs (to students) of education and the financial benefits arising from a degree. Corliss, Daly and Lewis (2020) have recently produced estimates of rates of return for a number of degrees using both 2006 and 2016 Census data. Although they consider a number of scenarios, estimates for what they term the base case are presented in Table 2 below.

Table 2: Estimated rates of return to an undergraduate degree by discipline

	Males		*Females*	
	2006	*2016*	*2006*	*2016*
Allied Health	13%	11%	14%	11%
Architecture	9%	10%	6%	8%
Creative Arts	*	5%	*	9%
Dentistry	20%	17%	17%	14%
Economics	18%	15%	15%	13%
Education	11%	12%	10%	12%
Engineering	15%	13%	14%	12%
Humanities	3%	4%	9%	6%
Information Technology	17%	15%	15%	14%
Law	17%	15%	15%	15%
Management & Commerce	17%	14%	15%	13%
Mathematics & Statistics	13%	12%	12%	13%
Medicine	16%	15%	15%	16%
Nursing	17%	19%	14%	16%
Science	10%	8%	11%	8%
All Bachelors	15%	13%	12%	13%

Source: Corliss, Daly and Lewis (2020) based on Census of Population and Housing data, 2006 and 2016, unpublished.

Table 2 shows quite clearly there is substantial incentive for private individuals to attain a bachelor degree although this incentive, as measured by the internal rate of return, fell somewhat between 2006 and 2016 for almost all disciplines.

There is considerable variation in the internal rate of return for the different fields of study. The highest rates of return for both men and women in 2006 and 2016 were in Dentistry, Nursing, Commerce, Law, Economics and IT. Both men and women had a high rate of return in Nursing and in Education in 2016 and improved on the rate of return in 2006.The lowest rates of return for both males and females were in the Creative Arts (a negative rate of return in 2006 but improving to a positive rate of return in 2016), Humanities and Architecture. In most cases but not all, the internal rates of return were slightly higher for males than for females, most notably in Dentistry and Nursing. On the other hand, females with a Humanities or Creative Arts qualification received a higher rate of return than their male counterparts. The STEM subjects – Mathematics and Natural Sciences- have positive, but below average, rates of return.

It is interesting to compare the rates of return with the growth in the number of completions over the period from 2008 to 2018 (Figure 3) which can be regarded as a measure of the supply response of students to market signals (in this case the rate of return). This must be qualified somewhat since for some disciplines, such as Medicine, places are strongly "rationed" or limited.

The large rise in completions in Health – which includes Dentistry, Medicine and Nursing has not stopped Health degrees from yielding a comparatively high rate of return, particularly for males. This indicates that for these disciplines new entrants have responded efficiently to labour market signals. The almost zero growth in new Education graduates is in contrast to low unemployment rates and high rate of return. Perhaps surprisingly, some areas with high completion growth rates – Architecture, Engineering and Science are among degrees with relatively low rates of return.

Daly, Fleming and Lewis (2006) use Census data to show that the ex-post private return to a university degree over the 1990s differed substantially from the ex-ante return estimated from 1986 Census data alone. Over that period the skill differential widened and the estimated ex- post rate of return was at least as good and usually substantially better for most of the groups identified. For many of those entering a post-COVID-19 labour force, the immediate opportunities unfortunately are unlikely to be so sanguine. This illustrates the significant difficulties involved in predicting employment prospects and incomes over a working life of more than 40 years and helps to put in perspective the likely effects of changes in the HECS/HELP rates on student choices in the medium term. These changes will alter the predicted private rate of return to individual degrees but an investment in a university education is likely to remain worthwhile from an individual's point of view, especially if the available employment opportunities while studying are low, reducing the opportunity cost of attending university.

The role of HECS/HELP in determining student discipline choice

As noted earlier, the decision to go to university and the choice of discipline is subject to a wide range of determinants. Given its wide-ranging implications for an individual's life, it is unlikely that the size of the student contribution to study (HECS/HELP) will be a major determinant of degree choice. Studies on the impact of the introduction of differential HECS by degree following the 1997 reforms found that they did not have a major impact on the social composition of university participation (Chapman and Ryan 2005). Nor has the low rate of HECS for Education degrees as a 'National Priority' degree since 1997 increased the number of students completing this degree (see Figure 3). This in part reflects the design of an income-contingent loan which separates the point of consumption from the time of repayment. Graduates do not need to repay the loan until an income threshold is reached. The choice of the income threshold for repayment and the rate of repayment are therefore critical to postponing repayment and encouraging participation of disadvantaged groups.

This threshold is particularly relevant for anyone in full-time employment, especially mature-aged students who may find themselves repaying their HECS/HELP debt while studying. The threshold in the 2020-2021 financial year is $46,620 and the prospect of immediate repayment may deter some potential students from undertaking a university degree. A second potential deterrent for mature-aged students is the focus on STEM disciplines for which they may not have the academic background and the high costs of degrees in Management and Commerce, the Humanities and

Social Sciences which may be more relevant to their employment but now will be very expensive.

If graduates do not expect to have earnings above the repayment threshold, the new HECS/HELP payments will not alter behaviour. For example, Creative Arts degrees have been one of the fastest growing degrees since 2006 despite poor labour market prospects. Under the new proposed HECS/HELP rates it is the Australian government that will be bearing the risk of the debt associated with undertaking these degrees if graduates never reach the HECS/HELP repayment threshold. Lewis and Lee (2020) report that only about half the graduates in Creative Arts repay their HECS/HELP debt.

The repayment of HECS/HELP debt has become a significant political issue. According to the most recent figures presented by the Parliamentary Library (Ferguson 2019), in 2017-18 there was $A61.9 million of HECS/HELP debt and 2.9 million debtors, including both higher education and vocational education students and graduates who owed the Australian government, on average A$21,557. The time taken to repay these debts has been increasing and in 2017-18 stood at 9.1 years. Chapman and Higgins (2013) estimated that the foregone HECS revenue from graduates between 1989 and 2011 working overseas was over $400 million. The larger HECS/HELP charges proposed for 2021 and the state of the post-COVID-19 economy are likely to increase these numbers even further.

Picking winners

The preceding discussion illustrates the difficulty of predicting how the Job-ready Graduate Package is likely to affect the mix of courses offered by universities and the decisions of students about their choice of discipline. In fact the Deputy Secretary of Higher Education from the Department of Education, Skills and Employment told a COVID-19 parliamentary inquiry that there had been no modelling of the package and in the past, responses to changes in the HECS/HELP rate had been 'muted' (Guardian 28 July 2020). Even if the package were to have its desired effect, the process of 'picking winners' is fraught with difficulties.

Workforce planning has had a very chequered history which is perhaps not surprising given working lives can last for over 40 years and people can move between occupations, adapting skills and retraining over time. There is not a great deal of matching between qualifications, skills and occupations, apart from certain exceptions such as medicine. In most of the skilled occupations only a minority pursue a lengthy career in their field of qualification. Even graduates from the most vocational courses, such as the trades, do not tend to stay in the associated occupation for the whole of their career. Generally, skills attained in most disciplines are often highly transferable meaning that lack of specific discipline-to-occupation matching is not necessarily the same as 'wastage' (Lewis 2008).

Future demand for skills is difficult to predict. Peetz (2020b) notes that given an ageing population there is likely to be a need for health workers in the medium term but the implications of further developments in artificial intelligence (AI) and other changes in the economy for the future skills in demand are much less clear-

cut. He cites evidence that supports the conclusions of earlier work (Kelly and Lewis 2010, Lewis 2015, Peetz and Murray 2019) that 'soft skills' such as creativity, problem solving, communication and emotional intelligence may be the critical skills for the future.

The push in the Job-ready Graduate Package toward STEM-based disciplines is not supported by the pre-COVID-19 evidence on labour market outcomes in all these disciplines (see Figures 4-6). In addition, Norton (2016) noted that the employment of science graduates was less likely to match their qualifications than for other graduates and that there were high attrition rates for IT graduates. Dockery and Bawa (2018) argue that women in Australia face particular problems in establishing careers in STEM disciplines. If the Coalition government is serious about promoting careers based in these disciplines, more will be required than just a change in university funding.

Given the complex factors involved in individual choices about further study and prospects for the labour market, it is not clear that government strategies to 'encourage' people into particular disciplines of study will necessarily produce the best outcomes for society. The individuals making these choices are best placed to know what is in their best interest and choices are made with the expectation that circumstances are likely to change in the future and further education and training may be required to fill particular career goals.

Conclusion

The COVID-19 pandemic has created significant problems for Australian universities by reducing income from international students, forcing the fuller adoption of online learning, and increasing the expected number of domestic applicants for the 2021 academic year. The Coalition government has responded by proposing a new funding model which is supposed to be 'cost neutral' and aims to use price signals to encourage both universities and prospective students to move into disciplines which the government believes will be in demand in the post-COVID-19 economy. This paper uses existing evidence to argue that the proposed Job-ready Graduate Package is likely to miss its mark, crucially with respect to having a medium-term impact on student choice.

The incentives for universities proposed in the package take no account of any future role of international students in Australian universities which may also influence the mix of disciplines which universities wish to offer. The two most popular disciplines with international students have been Management and Commerce, and IT. The former is not one of the proposal's preferred areas of study. The cross-subsidisation of university research by teaching revenue is likely to require a continued intake of international students in the future. The size of the international student intake has in the past been closely linked to immigration and the ability to obtain visas which enable international graduates to work in Australia. The future of this pathway into the Australian labour force will also be relevant to determining the number of potential students from overseas and hence the mix of disciplines offered by Australian universities. It also seems likely that universities will be reluctant to expand courses

for which there is limited domestic demand, even if there are financial incentives to do so.

On the domestic student side, evidence shows that the decision to attend university and the choice of discipline is based on a number of factors including socio-economic status, university entrance scores, level of school and career counselling support, psychological factors and the labour market experience of graduates. There is little evidence that changes in HECS/HELP in the past have had a big impact on students' choice of discipline although these proposed changes are larger than any earlier ones. The Deputy Secretary of Higher Education recently told a parliamentary committee that the past response had been 'muted' and there had been no modelling of the most recent changes so it will be a matter of waiting to see if these changes have a very different effect than earlier ones. The choice of university discipline is the beginning of a series of career choices and people are likely to take a longer term view of the benefits and costs of a particular degree rather than being strongly influenced by the size of the HECS/HELP bill. For example, are discouraged Law students likely to switch to a degree in Agricultural Science? The HECS/HELP bill will not be relevant until their earnings exceed the repayment threshold. Given the nature of income contingent loans, it may be the Australian government which bears an increasing cost of the rising HECS/HELP debt if graduate incomes do not reach this threshold.

The strategy of workforce planning fell out of favour after the 1960s because of its lack of success. It does not acknowledge the fluid nature of the labour market where people retrain and shift between occupations as opportunities arise. Given the uncertainty which is expected in a post-COVID-19 world, in addition to existing technological and economic changes in the nature of work, forecasting the extent and the direction of changes in the aggregate demand for various skills over the next decade is particularly difficult. Individuals are best placed to make these choices for themselves rather than relying on government direction.

References

Australian Bureau of Statistics (2020), 'The Labour Force Survey', ABS cat no. 6202.0, Canberra. www.abs.gov.au

Bond-Smith, S and Cassells, R. (2020), 'Analysis of benefits and costs of proposed higher education reforms', BCEC Research Brief Covid-19 #8, BCEC, Curtin University.

Borland, J. and Coelli, M. (2017), 'Are robots taking our jobs?' *Australian Economic Review*, Vol 50:4 pp377-97.

Chapman, B. and Higgins, T. (2013), 'The costs of unpaid higher education contribution scheme debts of graduates working abroad' *The Australian Economic Review* vol 46:3 286-99.

Chapman, B and Ryan, C (2005), 'The access implications of income-contingent charges for higher education: lessons from Australia', *The Economics of Education Review* Vol 24 491-512.

Corliss, M., Daly, A. and Lewis, P. (2020), 'Is a university degree still a worthwhile financial investment in Australia', *Australian Journal of Education*, Vol 64 (1) 73-90.

Daly, A. Fleming, D. and Lewis, P. (2006), 'A cohort analysis of the private rate of return to higher education in Australia', *the Australian Journal of Labour Economics*, Vol 9(3) 257-268.

Deloitte Access Economics (2016), 'The cost of delivery of higher education', report prepared for the Department of Education and Training, https://DESE.gov.au

Department of Education, Skills and Employment (DESE), (2020a), 'Job-ready Graduates Discussion Paper, https://DESE.gov.au

Department of Education, Skills and Employment (DESE), (2020b), 'International Student Enrolments in Australia 1994-2019', https://internationaleducation.gov.au/research/International-Student-Data/Pages/InternationalStudentData2019.aspx#Annual_Series

Department of Education, Skills and Employment (DESE), (2020c), 'The Job-ready Graduate Package', http://DESE.gov.au/job-ready

Department of Education, Skills and Employment (DESE) (2020d), uCube, Higher Education Data.

Dockery, A.M. and Bawa, S. (2018), 'Labour market implications of promoting women's participation in STEM in Australia', *the Australian Journal of Labour Economics*, Vol 21:2 125-148.

Ferguson, H. (2019), 'Updated Higher Education Loan Program (HELP) debt statistics - 2017- 18', Parliamentary Library, https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/FlagPost/2019/March/HELP-debt-statistics-2017-18

The Guardian (28 July 2020), https://www.theguardian.com/australia-news/2020/jul/28/australian-government-has-no-modelling-on-effect-of-university-fee-hikes-official-reveals

Jackson, K. (2003), 'The Higher Education Contribution Scheme', updated Aug 2003, Parliamentary Library, https://aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/Publications_Archive/archive/hecs#

Jackson, D., and Collings, D., (2017), 'The Influence of Work-integrated Learning and Paid Work during Studies on Graduate Employment and Under-employment', *Higher Education* pp1-23.

Kelly, R. and Lewis, P. (2010), 'The Change in Labour Skills Over the Business Cycle', *Australian Bulletin of Labour*, Vol 36, No 3, 260-77.

Law, H (2020), 'The underrepresentation of women in maths-intensive fields of study; the role of teenage occupational expectations, self-assessed maths competence and subject choice in Year 12' in eds Forrest, C and Scobie, C. '25 Years of LSAY', NCVER, http://NCVER.edu.au/

Lewis, P. (2008), *The Labour Market, Skills Demand and Skills Formation*, Research Report No 6/2008, The Academy of Social Sciences in Australia, Canberra.

Lewis, P. (2015), 'Technological and structural change in Australia's labour market', in Committee for the Economic Development of Australia (CEDA 2015), *Australia's Future Workforce*, Melbourne.

Lewis, P. and Lee, J.Y. (2020), 'The labour market outcomes of Australian Creative Arts degree holders', *Australian Journal of Labour Economics*, Vol 23, No 1, 21-42.

Marks, G, MacMillan, Hillman, K (2001), 'Tertiary entrance performance: The role of student background and school factors' ACER, Research report 22. https://research.acer.edu.au/lsay_research/24

Norton, A. (2015), 'The cash nexus: how teaching funds research in Australian universities', Grattan Institute Report 2015-9, The Grattan Institute http://www.grattan.edu.au/

Norton, A. (2016), 'Mapping Australian higher education 2016', The Grattan Institute http://www.grattan.edu.au/

Norton, A. (2020), 'A simpler reset could have met Dan Tehan's education aims', Sydney Morning Herald https://www.smh.com.au/national/a-simpler-reset-could-have-met-dan-tehan-s-education-aims-20200619-p55481.html

OECD (2019), Education at a Glance, OECD.org/education/education-at-a-glance EAG_CN_AUS.pdf

Parker P. (2020), Juxtaposing maths self-efficacy and self-concept as predictors of long-term achievement outcomes in eds Forrest, C and Scobie, C. '25 Years of LSAY', NCVER, http://NCVER.edu.au/

Peetz, D. and Murray, G. (2019), Women's employment, segregation and skills in the future of work, *Labour & Industry: a journal of the social and economic relations of work*, 29:1, 132-148.

Peetz, D. (2020a), 'University reforms pose bigger problems than many realise', John Menadue, https://johnmenadue.com/university-reforms-australia-by-david-peetz/

Peetz, D. (2020b), 'Can government actually predict the jobs of the future?', https://theconversation.com/can-government-actually-predict-the-jobs-of-the-future-141275?utm_medium=email&utm_campaign=Latest%20from%20The%20Conversation%20for%20June%2026%202020%20-%201661415997&utm_content=Latest%20from%20The%20Conversation%20for%20June%2026%202020%20-%201661415997+CID_4627bff9d120dd515d5dca91a045441a&utm_source=campaign_monitor&utm_term=Can%20government%20actually%20predict%20the%20jobs%20of%20the%20future

Productivity Commission (2020), 'Why did young people's incomes decline?' *Commission Research Paper*, Canberra, www.pc.gov.au

Tomaszewki, W., Perales, F. Xing, N. (2020), 'Schools and career guidance key to widening university participation' in eds Forrest, C and Scobie, C. '25 Years of LSAY', NCVER, http://NCVER.edu.au/

bankwest | Curtin University

Bankwest Curtin Economics Centre

2019 SUBSCRIPTION TO THE AUSTRALIAN JOURNAL OF LABOUR ECONOMICS

The Australian Journal of Labour Economics [ISSN 1328 1143] of the Centre for Labour Market Research is published twice a year.

I would like to subscribe/renew my subscription for:

WITHIN AUSTRALIA*

☐ 1 year $146 (including GST) (Students $95) (Institutions $196)

☐ 3 years $358 (including GST) (Students $179) (Institutions $513)

*Includes GST

INTERNATIONAL

☐ 1 year AUD$182 (Students AUD$130) (Institutions AUD$206)

☐ 3 years AUD$424 (Students AUD$284) (Institutions AUD$526)

METHOD OF PAYMENT

☐ For on-line credit card payment please visit our webpage for details:
https://payments.curtin.edu.au/OneStopWeb/AJLE

Name:..... Title:.....

Company/Organisation:.....

Address:.....

.....

Email:.....

For further details:

Subscription Manager
Bankwest Curtin Economics Centre
Curtin University
Curtin Business School
GPO Box U1987 Perth WA 6845 Australia

Telephone: +61 89266 1744
For further details email: ajle@curtin.edu.au