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No one left behind

Why Australia should lock in full employment

Brendan Coates and Alex Ballantyne

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Overview

This report shows why Australia should aim to lock in full employment – where everyone who wants a job can find a job. It demonstrates that all workers suffer when unemployment is high, but the most vulnerable workers suffer the most. And the costs of failing to reach full employment increase over time.

Australians who lose their job suffer large falls in their income that persist well after they find another job. Workers who otherwise have good work histories will still have an 11 per cent lower labour income five years after a three-month spell of unemployment. The cumulative effect over five years is equivalent to nearly a year of lost pay. Unemployment also causes worse mental health and is associated with higher rates of suicide.

Low-wealth and low-wage workers are more than twice as likely to lose their jobs when unemployment rises. Younger, less-educated workers and those in routine manual jobs are also hit harder. Sustained low unemployment and under-employment are among the best ways to improve the lives of the most vulnerable workers.

But high unemployment also hurts those who keep their jobs. A larger pool of unemployed workers reduces the bargaining power of all workers. High unemployment in the years leading into the COVID crisis accounts for at least one-third of the slowdown in wage growth in Australia since 2013.

Weak labour markets also cast long shadows. Even temporary bouts of unemployment can cause permanent damage if workers' skills erode. Spells of long-term unemployment can cause workers to give up and walk away from the job market. And weak demand for labour weighs on economic growth because firms have little incentive to expand and make new investments.

Australia's economy was sluggish in the years immediately before the COVID recession: inflation had been below its target for more than half a decade, unemployment and under-employment were persistently higher than they could have been, and many Australians had not had a decent pay rise in years.

But Australia has recovered much faster than after previous recessions. The unemployment rate is now at a near 50-year low of just 4 per cent, and the labour market is the strongest it has been for decades. This will benefit Australia's most vulnerable workers the most. We should learn the policy lessons.

Australia's rapid economic recovery from the COVID recession did not occur by accident. It is a macroeconomic success story, the result of unprecedented monetary policy – record low interest rates – and unprecedented fiscal policy – hundreds of billions of dollars of government spending to keep households and businesses afloat and stimulate economic activity.

But as the crisis fades, inflation is reemerging – in Australia and around the world – for the first time in more than a decade. This puts full employment at risk. In the short term, the Reserve Bank will need to try to tame inflation, and the Federal Government should avoid adding further fiscal fuel to the fire while inflation is high.

But Australia should not lose sight of the prize of full employment. Whoever wins the 2022 federal election should make sustaining full employment a baked-in national priority. This report shows why Australians should not settle for anything less.

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1 Full employment should be a national priority

Unemployment is costly – for individuals, households, businesses, and the nation.[1] Sustained high unemployment can cause long-lasting damage – scarring workers and reducing the productive capacity of the economy, which erodes living standards for the next generation.

Australia's economy was sluggish in the years immediately before COVID struck. Inflation had been below its target for more than half a decade, unemployment was persistently higher than it could have been, and many Australians had not had a decent pay rise in years. But after a much quicker than expected rebound from the COVID recession, Australia has its strongest labour market in decades.

This report lays out why achieving full employment – where everyone who wants a job can find a job – is so important to the lives of Australians, and especially for many of our most vulnerable.

1.1 Australia's macroeconomic framework

Monetary policy

The mandate of Australia's independent Reserve Bank, as set out in the *Reserve Bank Act (1959)*, is to contribute to: the stability of the currency (that is, low and stable inflation); the maintenance of full employment; and the economic prosperity and welfare of the people of Australia.

The Reserve Bank uses an inflation target to guide its monetary policy decisions.[2] The aim is to 'keep consumer price inflation between 2 and 3 per cent, on average, over time'.[3] In other words, inflation can be temporarily below 2 per cent or above 3 per cent, but should usually be within this range. The Reserve Bank seeks to hit its inflation target by setting interest rates to stimulate or dampen demand.[4] The inflation target helps to anchor what people expect inflation will be in future.[5]

Pushing towards full employment will usually help to hit the inflation target. When the economy overheats and the labour market is very tight, demand will outstrip the supply of goods and services, generating inflation. In this circumstance, the Bank needs to apply the brakes, by raising interest rates. And when unemployment is high, there is a shortfall in demand, and so inflation is weak. In this circumstance, the Bank needs to stimulate demand, by cutting interest rates.

But when the economy is hit by supply shocks – disruptions to the normal production of goods and services – inflation and unemployment can both be high (so-called 'stagflation'). This can be difficult to address with monetary policy, because interest rates primarily affect

1. The Australian Bureau of Statistics (ABS) defines people as being unemployed when: they are not working one hour or more; are actively seeking work; and currently available for work. The definition of at least one hour of paid work constituting employment is the international standard adopted in 1982 by the International Labour Organisation. See ABS (2021a).
2. This is formally spelled out in an agreement between the Treasurer and the Governor of the Reserve Bank, signed after each federal election: RBA (2016).
3. Ibid.
4. Interest rates affect demand in various ways, such as changing the incentive to save for the future or spend now, and changing households' disposable incomes after mortgage repayments. The primary tool for monetary policy is the target for the overnight cash rate, but other 'unconventional' tools aim to affect longer-term interest rates, expectations, and credit provision. See RBA (2022a).
5. Debelle (2018); and Gillitzer and Simon (2015).

demand, rather than supply.[6] As a small, open economy, Australia is exposed to global shocks that monetary policy cannot directly offset.[7]

Fiscal policy

Fiscal policy operates through changes in the level and composition of government spending, the level and types of taxes levied, and the level and form of government borrowing.

Over the past few decades, the Federal Government has adopted fiscal rules that generally aimed to balance the budget over the business cycle and constrain the overall size of government as a share of the economy.

The balance of government spending and taxation can have a substantial impact on demand. The setting of monetary policy can take this into account and adjust accordingly.[8] But once interest rates get close to zero, conventional monetary policy cannot do much more to stabilise demand, leaving the Reserve Bank to rely only on unconventional tools (such as quantitative easing). This is when fiscal policy is most effective.[9] Fiscal policy needs to support demand during severe recessions and when monetary policy alone cannot do so.

6. For example, shocks that increase the price of oil will lead to higher inflation, but raising interest rates to counter inflation does not target the source of the shock and instead affects demand across the whole economy. So there is a choice between higher inflation or lower overall economic activity.
7. Australia's flexible exchange rate provides a crucial buffer in this respect, cushioning the economy from global economic shocks, and allowing monetary policy to primarily focus on domestic conditions. See Stevens (2013).
8. For example, if fiscal stimulus were overly inflationary, the Reserve Bank would react with higher interest rates than would otherwise be the case. The independence of the Reserve Bank limits the effect of governments that might pursue overly stimulatory policies for political ends.
9. See Christiano et al (2011), DeLong and Summers (2012) and McKay and Reis (2016). In part, this is due to monetary and fiscal policy working in coordination at such times.

The range of fiscal policies available is broad and can target distributional concerns; in contrast, the Reserve Bank mainly relies on setting interest rates.[10] Interest rates have a direct effect on the price of assets, whereas fiscal policy need not.[11] Fiscal and monetary policy therefore are not one-for-one substitutes.[12] The pandemic has further demonstrated the importance of fiscal policy, especially when interest rates are already very low.

1.2 We can have 'too much' employment

Full employment occurs when the supply and demand for labour are balanced – when all of the available pool of labour is used to produce the goods and services that people want to buy. But we can have too much of a good thing.

When the labour market is overly tight, demand will outstrip the supply of goods and services, generating inflation. When inflation exceeds wage growth, this will erode people's standard of living by reducing the amount they can buy. Poorer households tend to be hit harder by inflation.[13]

A little bit of inflation can 'grease the wheels', but too much can throw 'sand in the gears'. History is littered with examples of policy failures that allowed inflation to spiral – from the hyperinflation of the German Weimar Republic during the early 1920s to the 'stagflation' of the

10. See Atkin and La Cava (2017) for an overview of the economic effects of monetary policy.
11. See Leong (2021) and He and La Cava (2020) on the distributional effects of monetary policy.
12. There has arguably been too much reliance on monetary policy, which has been noted by the Reserve Bank itself, among many others. See Debelle (2017a) and Lowe (2019).
13. However, this depends on a range of factors. See Creedy and Van De Ven (1997), David Jacobs and Williams (2014) and ABS (2021b) in the Australian context, and Brainard (2022) for the US.

1970s across many advanced economies – with dire consequences for people's day-to-day lives.[14]

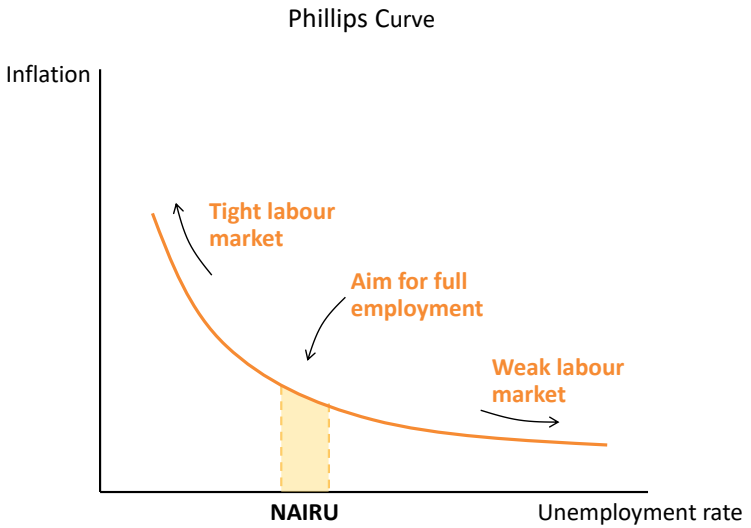
Balancing employment and inflation

Macroeconomic policy seeks to navigate between the risks on either side of full employment. If policy is too restrictive, it could stall the economy and induce a recession. If policy is too lax, the economy could overheat, sparking inflation which becomes costly to contain.

This balance is illustrated in the so-called Phillips Curve, first described in 1958 (Figure 1.1).[15] The Phillips Curve shows that if the unemployment rate is pushed down too far, wage pressures mount due to an excess of labour demand over supply, which will be passed through to consumers via higher prices.

The conventional framework proposes that there is an equilibrium unemployment rate consistent with stable inflation.[16] An unemployment rate below this level will tend to spur unsustainably high wage growth and inflation, while unemployment above this level will weigh on wages and inflation. This equilibrium level of unemployment is often referred to as the non-accelerating inflation rate of unemployment, or NAIRU.[17] It is one way of measuring the full employment objective of policy makers (see Box 1) – the Reserve Bank and Treasury maintain models that estimate the NAIRU.[18]

Figure 1.1: The Phillips Curve illustrates the relationship between between inflation and unemployment



Note: NAIRU = non-accelerating inflation rate of unemployment.

14. These episodes were driven by a combination of policies and shocks, rather than unemployment simply being too low in its own right. See Sargent (1982), Goodfriend (2007) and Cagliarini et al (2010).
15. Phillips (1958).
16. Phelps (1968); and Friedman (1968).
17. See RBA (2022b).
18. Estimates can differ substantially across models. See Cusbert (2017) and Ruberl et al (2021).

Box 1: What is 'full employment'?

Full employment is a concept with a long history in Australia. For example, the 1945 white paper on full employment stated:[a]

> Full employment can be maintained only as long as total expenditure provides a market for all the goods and services turned out by Australian men and women, working with available equipment and materials, and fully employed after allowing for the need for leisure.

In practice, full employment is when supply and demand are balanced in the labour market, and in the markets for goods and services. But there will always be some amount of unemployment, because it takes time to search for a job, and sometimes workers need to retrain as demand for skills change.

Policy makers want to pursue a *sustainable* level of employment that does not generate spiralling inflation. That's why the NAIRU – the 'non-accelerating inflation rate of unemployment' – is the most common measure of full employment. The NAIRU measures the unemployment rate that is consistent with stable inflation. This can be affected by policy settings and labour market institutions. But the NAIRU is far from perfect. Estimates are imprecise and subject to large revisions.[b] They can also differ markedly from assessments of the full utilisation of labour supply.

Broader measures of full employment also include the under-employed – workers who have a job but want to work more hours – and even workers who have left the labour force due to a lack of demand. The under-employed, as well as the unemployed, should be front of mind when policy makers assess the extent of spare capacity in the labour market.

a. Commonwealth of Australia (1945).
b. See Galbraith (1997), Staiger et al (1997) and Ball and Mankiw (2002).

Inflation is a barrier to lowering the unemployment rate beyond full employment. Good policy aims to ensure any deviation from full employment – so-called 'cyclical unemployment' – is small. But micro-economic and institutional reforms could also lower the level at which a tight labour market creates excessive inflationary pressures. Although there is little consensus on what policies might lower the NAIRU (and whether the business cycle itself plays a role),[19] increasing productivity growth should always be a focus for improving livelihoods in the long run.[20]

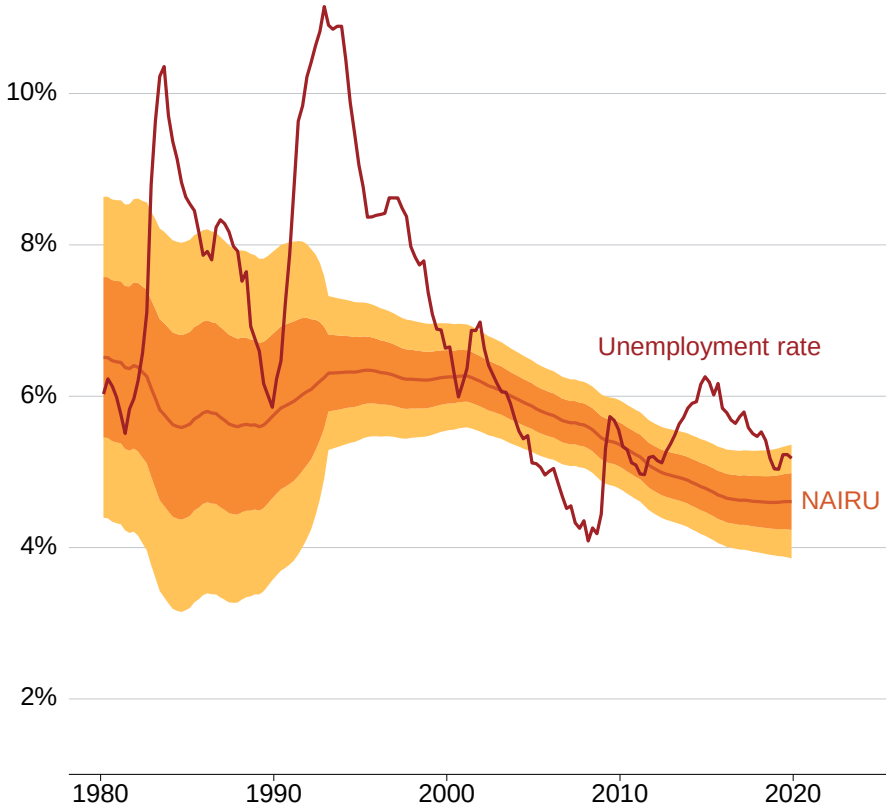
1.3 Demand for labour was weak in the decade before COVID

Demand for labour was weak in Australia in the decade before the pandemic. Although unemployment stayed mostly in the range of 5-to-6 per cent – well below the tumultuous 1980s and early 1990s (Figure 1.2) – a broader range of indicators showed there was too much slack in the labour market. Workers were not getting the hours they wanted. Unemployed people spent longer searching for a job. Inflation undershot the Reserve Bank's target. And wage growth was stagnant.

Underutilisation of labour had begun to build since the 2008 Global Financial Crisis (GFC). Workers were taking longer to find jobs, with the average length of unemployment increasing from about 35 weeks to about 50 weeks before COVID struck (top panel, Figure 1.3).[21] As a result, long-term unemployment (defined as unemployment lasting longer than one year) increased. The share of unemployed workers

19. Ball and Mankiw (2002); and Heimberger et al (2017).
20. See Wood et al (2022) for a raft of reforms to boost productivity and government efficiency.
21. The fact that this began to trend upwards before the terms of trade, and that it was seen across all states, suggests that this was not solely a structural adjustment due to the mining boom. See also Cassidy et al (2020).

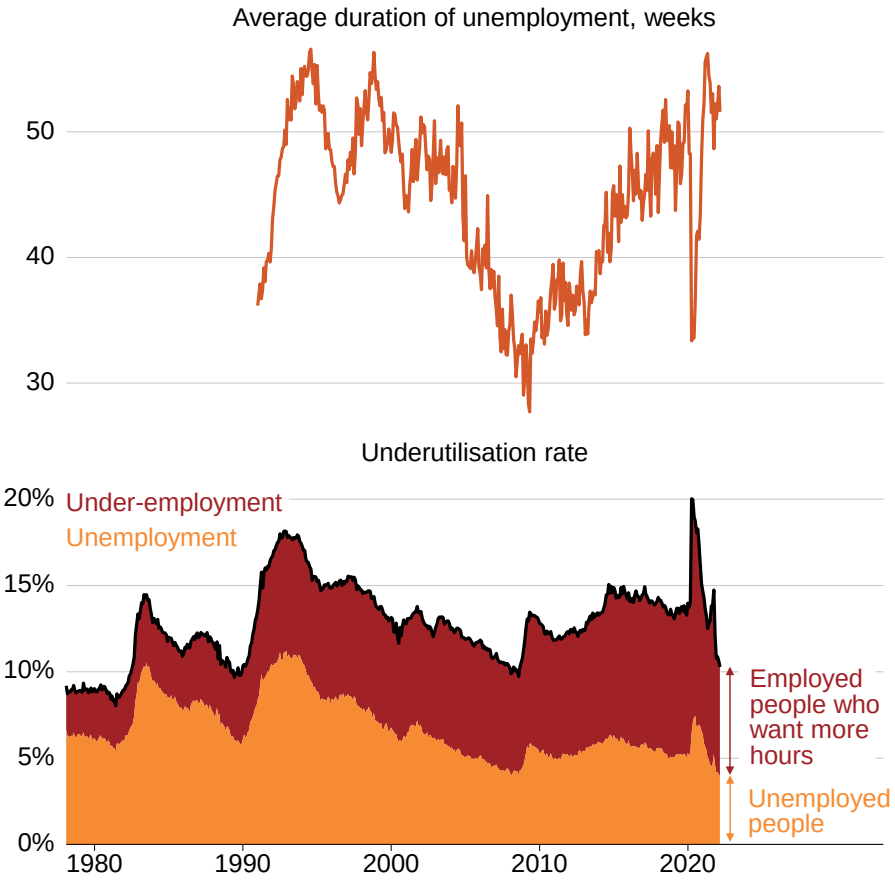
Figure 1.2: Demand for labour was weak in the decade before COVID



Notes: RBA estimates of the non-accelerating inflation rate of unemployment (NAIRU). Orange shaded regions are the one and two standard error intervals.

Source: Bishop and Greenland (2021).

Figure 1.3: More people are working part-time but would prefer more hours



Notes: Bottom panel is cumulative change since February 1978 and reflects trend estimates. People moving from full-time to part-time work captures the trend increase in part-time work driving up the under-employment ratio. Changes in preference for hours unrelated to composition captures changes in the number of people wanting more hours within part-time and full-time work separately.

Source: Grattan analysis of ABS 6202.0 and Chambers et al (2021).

who were in long-term unemployment rose from about 15 per cent to about 25 per cent.[22]

Since the end of the early-1990s recession, the under-employment rate – the share of the labour force who are employed but would prefer to work more hours – had been stable at 6-to-7 per cent, but after the GFC it too began to increase (bottom panel, Figure 1.3). Most of the shift since the GFC has not been due to the increasing prevalence of part-time work.[23][Graph 4] Workers were simply not getting the hours they wanted. Firms are increasingly adjusting to their labour needs by increasing or decreasing the number of work hours they offer, rather than the number of workers they employ.[24] Hence the overall increase in under-employment.

The weak labour market in the years preceding the pandemic appears to have particularly hurt younger Australians. Unemployment was rising for young people before the pandemic, and under-employment was also much higher than in previous decades.[25] In fact, the gap between youth employment and 'prime age' employment continued to increase from the GFC through to the pandemic.[26]

Throughout this period, the unemployment rate was higher than estimates of the NAIRU, suggesting a shortfall of labour demand. Wage growth was persistently weaker than expected and inflation undershot the RBA target band for years on end. Estimates of the NAIRU were revised down as the malaise continued, recognising that the labour market was weaker than previously thought.[27] This period highlights the pitfalls of relying too heavily on a single estimate of full employment, particularly one that does not capture broader underutilisation of current and prospective workers in the labour market (Box 1).

22. ABS (2022a).
23. Chambers et al (2021).
24. Bishop et al (2016); and Chambers et al (2021).
25. Wood et al (2019, Figure 3.6).
26. Wood et al (ibid, Figure 3.5).
27. Ellis (2019).

1.4 But we are now on the brink of full employment

Heading into the pandemic, economists feared the worst. Two years later, the state of the labour market is surely better than any had dreamed. The recovery has been much faster than any previous downturn (Figure 1.4).

Unemployment had fallen to 4 per cent by early 2022, a rate not seen since just before the GFC, or before that, nearly 50 years ago (Figure 1.5). Under-employment has also fallen, from about 8.5 per cent before COVID to 6.3 per cent in early 2022. Yet wage growth has been slow to pick up, so far only returning to pre-pandemic rates.[28] Estimates of the NAIRU have been revised lower still.[29]

This report shows that the recovery will benefit all households through higher wage growth and stable employment. But achieving full employment helps vulnerable workers the most, including younger, and lower-income Australians with fewer skills. Putting these workers in stable jobs could help to reverse the recent trend towards rising inequality in Australia. A rapid return to full employment after a recession also avoids the long-term scarring effects that permanently reduce living standards.

28. Many wage contracts are renegotiated with a lag. Only 38 per cent of employees are paid under individual arrangements, which are the most responsive to changes in economic conditions. The rest are mostly employed on collective agreements, which are typically renegotiated every 2-to-3 years, or are covered by awards, which are typically linked to the Annual Wage Review conducted by the Fair Work Commission. ABS (2022b).
29. Treasury (2022).

1.5 We should learn the policy lessons

Australia's rapid economic recovery from the COVID recession did not occur by accident. It primarily reflects unprecedented fiscal and monetary policy stimulus.[30] In contrast, COVID border closures over the past two years played only a small role in driving unemployment to historic lows.[31] Our low unemployment today is a testament to the success of economic policy. This report demonstrates the benefits of bouncing back quickly after a downturn. It is a lesson we should learn for future recessions.

Full employment is now within reach for Australia. But as the crisis gradually fades, we face a different set of shocks. Australia's economy is being affected by a series of disruptions to the production and distribution of goods and services: higher shipping prices, delays in the transport of materials and products, extreme weather events around the world, war in Europe. These are forces largely outside the control of Australian policy makers. A higher rate of inflation is unavoidable while these disruptions continue. The greater danger is that inflation, wage growth, and inflation expectations become self-reinforcing.

This puts full employment at risk. Inflation expectations were tamed in the early-1990s only by mass unemployment (see Box 2). That is too high a price to pay again. In the short term, the Reserve Bank will need to seek to tame inflation. The Federal Government should avoid adding further fiscal fuel to the fire while inflation is high. But Australia should not lose sight of the prize of full employment, and especially the benefits it brings to some of our most vulnerable.

Figure 1.4: The recovery from the pandemic has been very fast
Change in labour market statistics since start of downturn

Note: Start of downturn defined as the month in which total underutilisation reached its minimum: June 1981, November 1989, July 2000, August 2008, August 2012, and March 2020.

Source: Grattan analysis of ABS 6202.0.

30. The Federal Government set aside $291 billion for stimulus payments. Including tax breaks and state government support, the International Monetary Fund comes up with a total of $362 billion. Coates et al (2022).
31. Ballantyne (2022) shows the effect of record low interest rates and unprecedented levels of government support for businesses and households is seven-to-eight times larger than the effect of border closures.

In the longer term, Australia's policy makers will need to get our broader macroeconomic policy settings right.

Australia's macroeconomic policy framework is about to be renewed, with the Coalition and Labor both committed to commissioning the first independent review of the Reserve Bank in more than 30 years.

Whichever party wins the 2022 federal election will also face big questions on the future path of fiscal policy. Monetary policy has been the main macro-stabilisation tool in Australia over recent decades. But now the potential role for fiscal policy is larger.

At the same time, structural budget pressures remain: the latest federal budget projects that spending will stabilise at 26.3 per cent of GDP by the end of the decade, compared to an average of 25 per cent in the decade before the COVID crisis.[32] Along with likely future interest rate rises, this means that over time, revenue and spending reforms are likely to be needed to reduce the size of recurrent deficits and maintain debt sustainability.[33]

The Federal Government will therefore need to review Australia's medium-term fiscal targets with an eye to managing the growing importance of fiscal policy in macro-stabilisation while also keeping debt sustainable.

The stakes for macroeconomic policy in Australia could not be higher. There has never been a more important time to lock in full employment.

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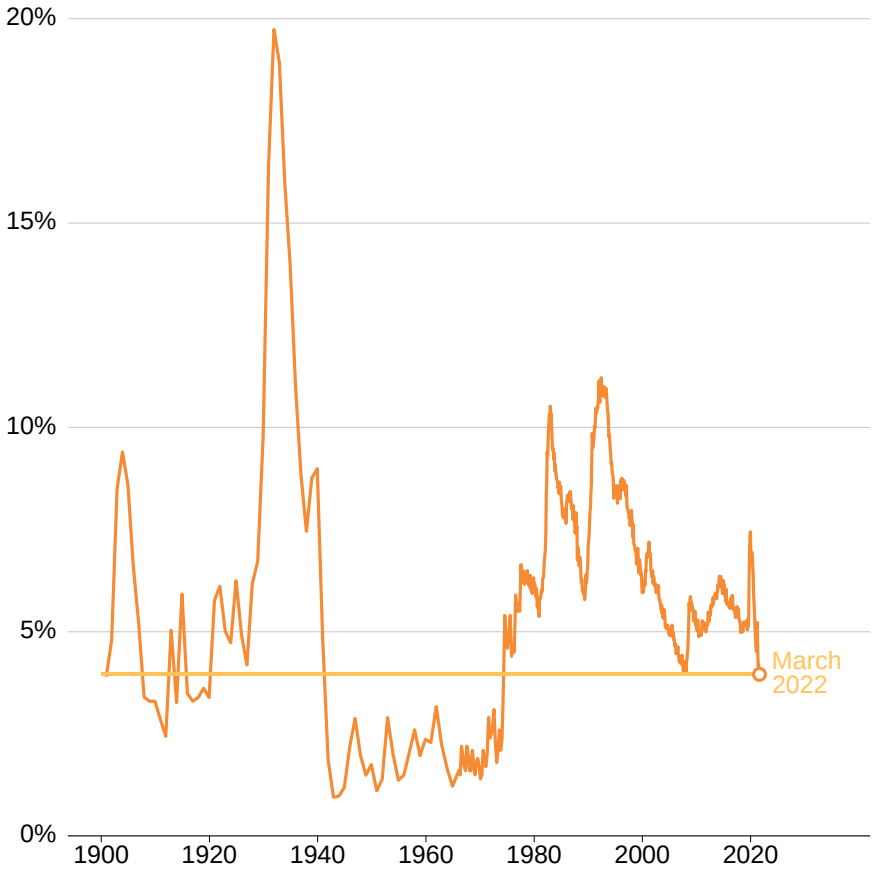
Figure 1.5: Unemployment is down to a level not seen in 50 years
Unemployment rate, June 1901 to March 2022



Note: Monthly seasonally adjusted data from 1978, quarterly unadjusted data from 1966 to 1978, and annual data before 1966.

Sources: ABS 6202.0 and Butlin et al (2014).

32. Treasury (2022).
33. Wood et al (2022).

Box 2: What happens when things go wrong?

The 1970s-80s show what can happen when things go wrong. After 30 years of unemployment between 1 per cent and 3 per cent, a sequence of shocks and policy responses starting in the mid-1970s led to a period of elevated unemployment that was not reversed for 30 years (Figure 1.6).

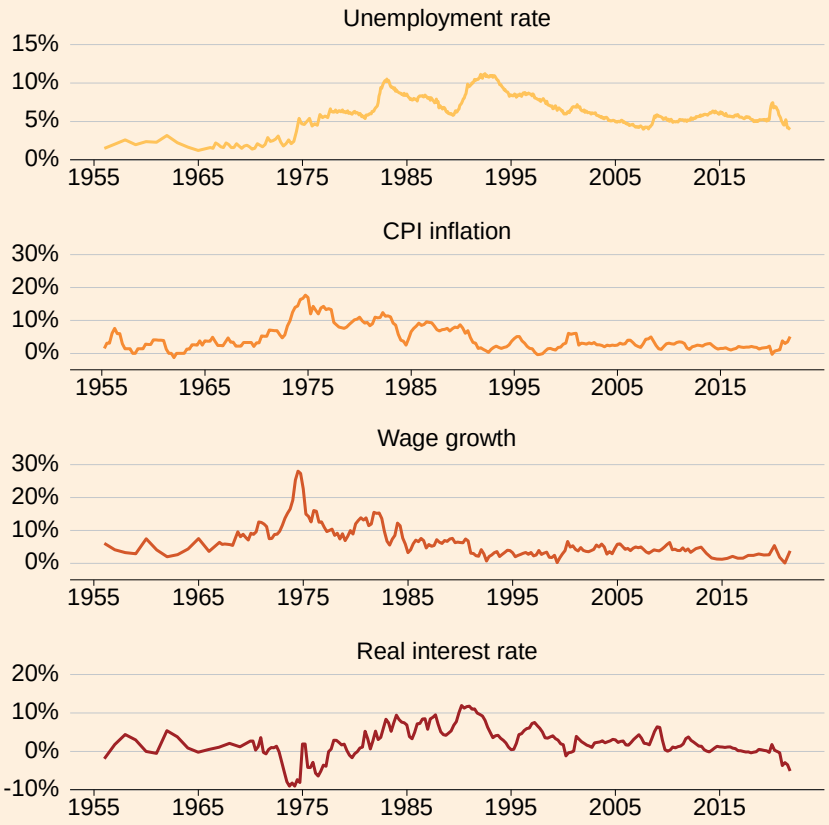
Inflation shot into double-digits in 1973 after the first oil crisis. Wage growth had been very high in the early 1970s, outstripping inflation plus productivity growth, even when inflation spiked (Figure 1.6). The unemployment rate rose soon after. The rapid increase in real wages is often cited as a cause of the rise in unemployment.[a] A wage/price spiral, particularly when accompanied by supply shocks that increase other costs for firms, can lead to higher unemployment and 'stagflation'.

Wage indexation based on past inflation was instated in 1975, in an attempt to avoid further wage/price spirals driven by wages being set in reference to *expected* inflation. Some hoped that productivity growth would then slowly decrease the real cost of labour and lead to a fall in unemployment.[b] That did not happen. Indexation may have tempered a wage/price spiral, but it also supported continued high expected and actual inflation.

Wage growth pushed ahead of inflation again in 1980. Taming inflation became a priority. Indexation was abandoned in 1981 and the real interest rate increased from about 2 per cent to nearly 10 per cent by 1984 (Figure 1.6). Unemployment climbed quickly over 1982-83, spiking at 10.5 per cent, before slowly recovering over the 1980s. Nonetheless, inflation remained elevated and it took a further deep recession in the early 1990s – 'the recession we had to have' – before inflation was finally tamed.

a. Gregory (1986); and Burgess (2004).
b. Corden (1979); McNelis (1988); and Burgess (2004).

Figure 1.6: The 1970-80s were very costly



Notes: Unemployment rate is monthly seasonally adjusted data from 1978, quarterly unadjusted data from 1966 to 1978, and annual data before 1966. CPI inflation is year-ended quarterly data. Annual wage growth is average weekly earnings (total), quarterly from September 1967, but reflects only male wages before September 1981. The real interest rate is ex-post. The interest rate is the quarter-average annualised rate on three-month bank-accepted bills.

Sources: Butlin et al (2014); ABS 6202.0; ABS 63020.0; RBA Tables F1.1 & G1.

2 Full employment boosts living standards

A strong labour market is crucial for Australians' living standards. Year-to-year fluctuations in economic conditions can have a large effect on incomes, mostly through the labour market. Locking in full employment now will help boost incomes and economic activity, keep more people in the workforce, and support long-overdue wage growth.

2.1 Most households earn their incomes in the labour market

Australians' living standards are largely driven by how they fare in the labour market.

Labour income accounts for about 80 per cent of average gross (before tax) real income for working-age households (Figure 2.1). Labour income was the main source of income for 61 per cent of all households in 2017-18.[34]

Government transfers – such as pensions, unemployment benefits, and carers' allowances – account for about 6 per cent of income for working-age households on average, but the median working-age household does not receive any transfers.[35]

Capital income – including business income and income derived from investments, rental income, and private pensions – accounts for about 10 per cent of income for working-age households on average,[36] but the median working-age household receives only about $100-to-$200 in capital income each year.[37]

34. ABS (2019).
35. DSS and Melbourne Institute (2021).
36. Businesses are ultimately owned and operated by individuals or households. Capital income accrues only to some households and is usually a small share of overall household income; however, HILDA does not collect information on capital gains, so capital income is understated.
37. DSS and Melbourne Institute (2021).

Productivity drives economic growth in the long-run,[38] but ensuring that workers share in the windfall requires a strong labour market.

2.2 The business cycle hits household income in various ways

The business cycle is characterised by phases of expansion and contraction in economic activity, which flow through into rises and falls in household income.[39] The business cycle can affect household incomes in a variety of ways: people can lose or gain jobs or hours worked; workers can get higher or lower wages; capital income can fluctuate as business profitability increases or decreases.

Research shows that the business cycle has a significant impact on incomes. For example, Stone (2016) finds that growth in an individual's real labour income is sensitive to national GDP growth – particularly for the poorest 40 per cent of Australians by income – but that the vast majority of the relationship is driven by people who move in and out of employment. In contrast, Bishop et al (2016) find that more of the labour market adjustment during downturns since 2000 occurred via reduced hours, compared with earlier downturns. The evidence also points to a clear relationship between wage growth and a tight labour market (see Section 2.4).

Using the Household, Income, and Labour Dynamics in Australia (HILDA) survey,[40] we find that a 1 percentage-point increase in real GDP growth is (on average) associated with a:

38. See Wood et al (2022) for a range of productivity-enhancing policy proposals.
39. There are various ways of measuring the business cycle, but GDP is a common benchmark. See Harding and Pagan (2002).
40. We extend the the framework used in Cervini-Plá et al (2015) and Stone (2016). See Appendix C for details.

- 1.1 percentage-point increase in individual real labour income growth;[41]
- 0.4 percentage point decrease in time spent unemployed;[42]
- 0.35 hour increase in weekly hours worked (a 1.3 per cent increase relative to the sample mean); and
- 3.45 percentage-point increase in real capital income growth (for those households who report capital earnings).[43]

The larger than one-for-one effect on labour income shows how important a strong economy is for households. Transitions into and out of employment play an important role, but so do hours worked.[44] Although the response of capital income is large, only a small group of high-wealth households receive a meaningful share of income from this source.

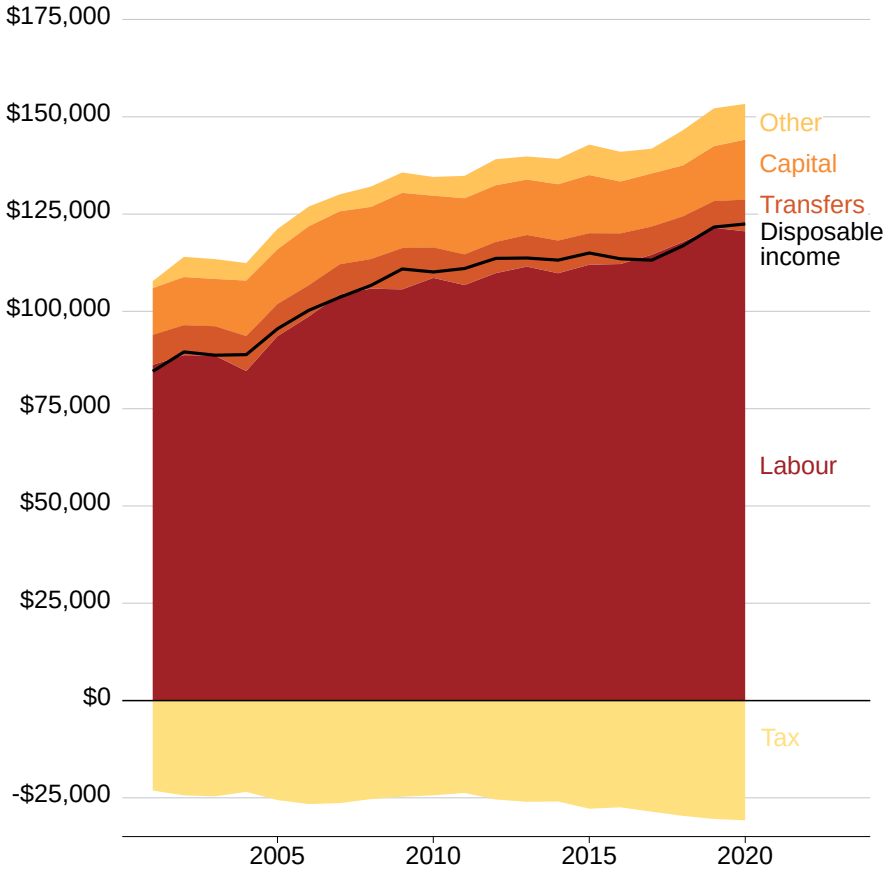
2.3 Unemployment is a heavy burden

Of all the miseries that can befall an individual, among the most destructive must be the loss of employment.[45] The immediate effect of losing a job is a dramatic reduction in labour income. But a spell of unemployment also affects workers, and their households, in a variety of other ways.

The financial cost may be felt even long after a new job is secured. This can be due to lower wages or hours in the new job, and reduced wealth if savings were spent during the period of unemployment.

41. The coefficient falls to 0.5 for a subsample of people employed across periods (which eliminates the effects of employment transitions).
42. This specification is effectively a microeconometric version of Okun's Law, which relates changes in unemployment to GDP growth.
43. This result is highly sensitive to the sample selection.
44. Wage growth can also be measured in HILDA, but there are some questions over the reliability of the measure (see Wilkins et al (2019, Box 4.2)).
45. Paraphrased from McGhee (1996).

Figure 2.1: Labour income drives household disposable income
Average annual real household disposable income by component, 2020 dollars



Notes: Working-age households (those where more than half of the adults are aged 18-64 and not retired) weighted by the HILDA cross-sectional household weights. Data are not equivalised for household size. Deflated by CPI. HILDA does not collect information on capital gains, so capital income is understated.

Source: Grattan analysis of HILDA Release 20.0.

The non-financial costs of unemployment are also significant: the loss of a job is not only the loss of income, but for many workers it can mean the loss of status, purpose, or identity. Unemployment damages mental health and reduces life satisfaction.[46] It is also associated with physical ill-health and suicide, and has been shown to have spillover effects on family members.[47]

Under-employment imposes a similar, albeit smaller, burden on workers as unemployment.[48] The effects are particularly acute for part-time employees who would prefer full-time work, highlighting the importance of considering broader labour market measures beyond unemployment alone when assessing the the strength of the labour market (Box 1).

2.3.1 Unemployment brings persistent income loss

Unemployment brings a period without paid work, which deprives most households of their main income source. But the effects can linger well after finding a new job.

People who suffer unemployment can be 'scarred' by the experience, particularly if they are out of work for a long time – their skills erode, their experience becomes less relevant, they lose touch with professional networks, and they become less attractive to employers.

Research shows people who lose their job tend to earn less for years afterwards,[49] especially when the labour market is weak.[50] This could be due to lower bargaining power, losing an employer-specific wage premium, or a loss of skills (real, perceived, or employer-specific) during unemployment.[51] Overseas studies tend to find reductions in income in the range of 10-to-30 per cent for workers five years after job loss.[52]

Australia's unique set of institutional arrangements – such as the independent Fair Work Commission, high minimum wages, and no compulsory unemployment insurance scheme – may mean that outcomes for Australian workers are different.[53] Australian studies are limited.[54] Lancaster (2021) finds that labour income recovers fully within four years of job loss.[55]

For this report, we have used HILDA to estimate the labour income loss associated with the first spell of unemployment for Australian workers.[56] We also estimate the effect of any subsequent periods of being unemployed or not in the labour force (NILF), because these can be caused by the initial period of unemployment.

46. McKee-Ryan et al (2005); and Winkelmann (2014).
47. Sullivan and T. v. Wachter (2009); Botha and Nguyen (2022); and Bubonya et al (2014).
48. Wilkins (2007).
49. For example, see Jacobson et al (1993), Krolikowski (2018) and Bertheau et al (2022).
50. Davis and T. M. v. Wachter (2011).
51. Other explanations include setbacks on the 'jobs ladder', on which workers are able to find better and more stable jobs through continued employment, and 'information asymmetries', which prevent employers correctly assessing how productive a potential employee will be. See Jarosch (2021) and Gibbons and Katz (1991).
52. Hyslop and Townsend (2017) find that displaced workers' income in New Zealand is 13-to-22 per cent lower after five years. See also Bertheau et al (2022).
53. Bertheau et al (2022) find large differences in effects across select EU countries, and that differences in labour market policies (such as training and job-matching services) explain much of the variation.
54. OECD (2016) finds that most workers who lose their job are re-employed quickly, but one in three suffers a persistently lower wage. Gray (2000) finds that long unemployment histories are associated with lower wages and fewer hours of work. Quintini and Venn (2013) and Sila (2019) assess re-employment after job displacement, but do not estimate the effects on income.
55. See Appendix A for details.
56. Rather than analysing job displacement as a discrete event, we model the income loss associated with the amount of time spent unemployed during each financial year. The interpretation is slightly different to the international literature. Rather than capture the effect of losing a job – irrespective of when a new job is found – we capture the effect of being unemployed itself. For details, see Appendix A.

We find that for people who become unemployed for the first time, incomes bounce back in the following two years, but stagnate at a level substantially below what they earned before becoming unemployed (Figure 2.2).[57] Even after five years, workers still have incomes about 11 per cent lower than before they were unemployed. The cumulative effect over five years is equivalent to nearly a year of lost pay – a huge blow to a household's finances.

International evidence shows that the earnings reduction from job loss is even higher during recessions.[58] Prolonged spells of unemployment, as are more common during a recession, risk even further detachment from paid employment. Many people in long-term unemployment stop looking for work altogether and leave the labour force.

Our results show that it is the first spell of unemployment that does the damage. Income tends to bounce back almost completely within two years of subsequent periods of unemployment or not being in the labour force (Figure 2.2).

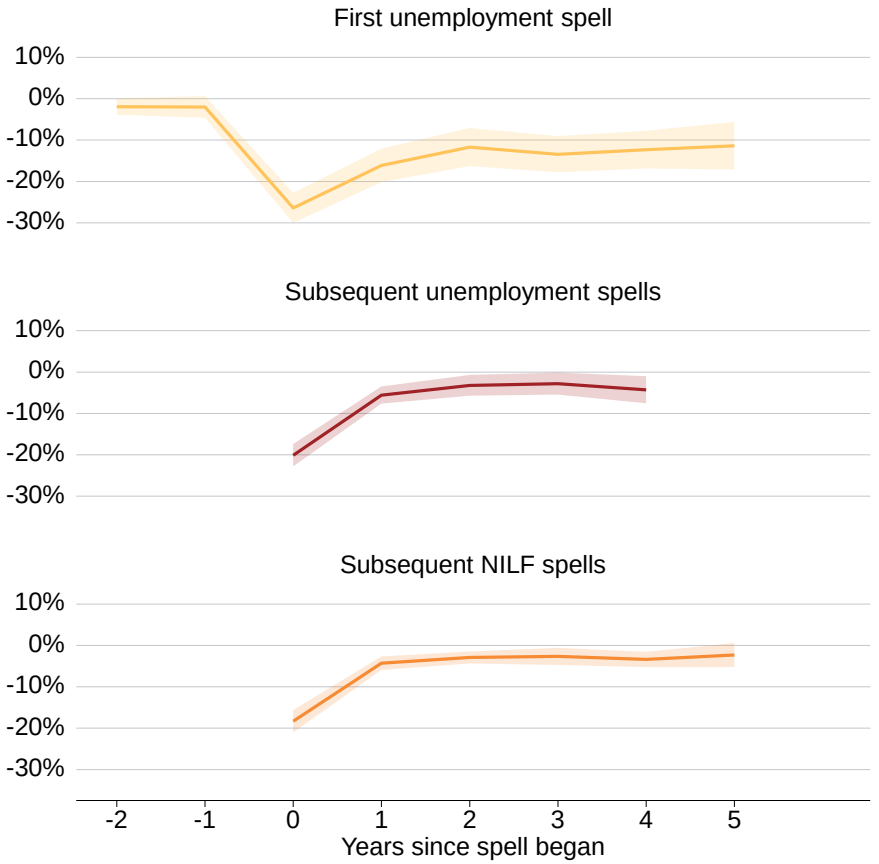
Recessions can have a lasting impact on young workers

When a young person enters the labour market, their future earnings depend on the strength of the economy at that time. If they enter a weak labour market, their future earnings will tend to be lower than if they enter a strong labour market.[59]

Treasury researchers recently examined the 'scarring' effect of recessions. Their findings are in line with earlier research showing unemployment can cast a long shadow over individual careers.[60] They found that when the youth unemployment rate goes up 5 percentage

Figure 2.2: Income stays permanently lower after the first period of unemployment

Percentage reduction in labour income due to three-month spells



Notes: NILF = not in the labour force. Estimates are shown as percentage changes relative to average labour income in the year before unemployment. They are derived from a regression of labour income on periods of unemployment and NILF, controlling for factors that affect income over the life cycle. Shaded regions are two-standard-error bands. For details, see Appendix A.

Source: Grattan analysis of HILDA Release 20.0.

57. A three-month unemployment spell reduces labour income in the same financial year by about 26 per cent. See Appendix A for further discussion.
58. Davis and T. M. v. Wachter (2011).
59. Rothstein (2020).
60. See Borland (2020).

points, wages for graduates are about 8 per cent lower than they would otherwise have been, and remain depressed for years.[61] Over a decade, young workers lose the equivalent of half-a-year's salary compared to otherwise-equivalent young people who graduated into a stronger labour market.[62]

Many older workers never regain a full-time job

A period of high unemployment can result in many workers leaving the labour market altogether. Many others return only to part-time work.

When demand for labour is weak, more workers spend more time away from employment, and it becomes less and less likely that they will find work again.[63] Searching for a job in a lousy market is depressing. Some workers may eventually call it quits and stop looking altogether – the 'discouraged worker effect'.

People in long-term unemployment more often leave the labour market than find a job (Figure 2.3). This has occurred at much higher rates over the past decade than it did in the 1990s, with about three times more workers leaving the labour force than finding jobs. In contrast, workers who are unemployed for less than a year tend to find employment about as often as they leave the labour force.

Recessions can also accelerate structural change, particularly the transition towards more part-time employment.[64] After the 1990s recession, many Australians (typically older men) never regained a full-time workload (Figure 2.4).[65] This continues to weigh on household income well after an economic recovery is secured.

61. See Andrews et al (2020).
62. Ibid.
63. Cassidy et al (2020).
64. Fahrer and Heath (1992).
65. This is consistent with the 'discouraged worker effect'. See Day and Jenner (2020).

2.3.2 Unemployment imposes heavy non-financial costs

People respond to job loss in different ways, but overall a spell of unemployment tends to worsen mental health and reduce life satisfaction.

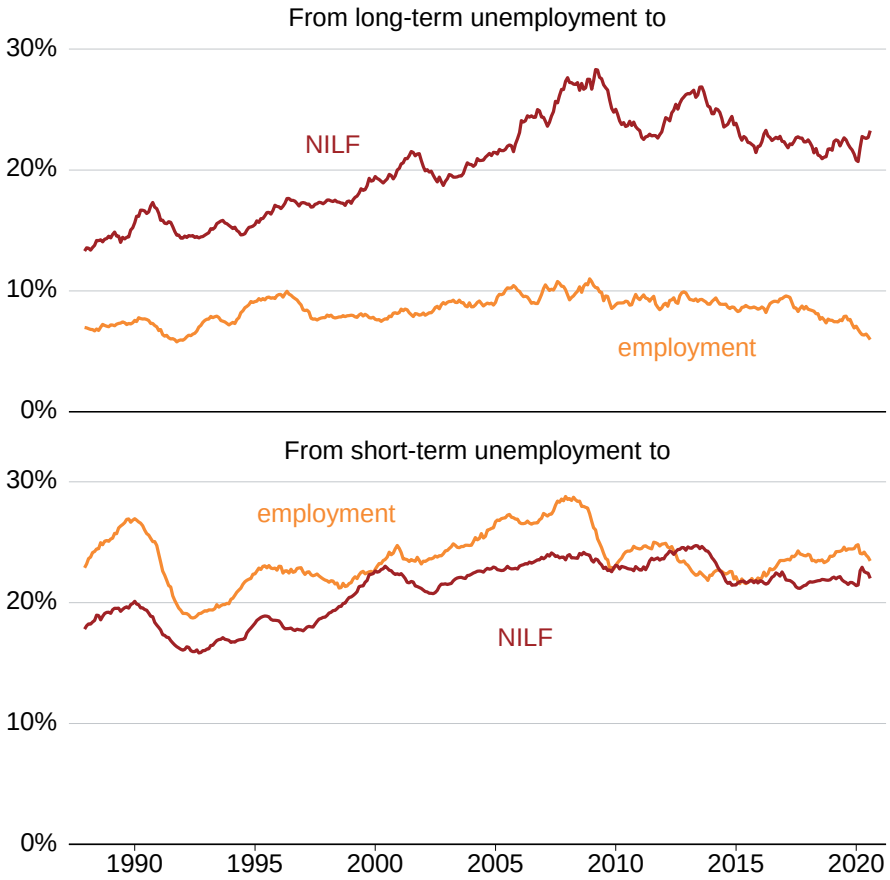
Extensive evidence shows that unemployed people have lower average mental health than employed people.[66] Research also shows unemployment is a direct *cause* of poor mental health,[67] including in Australia.[68] Conversely, reemployment causes significant improvements to mental health.[69] Unemployment is also associated with lower overall life satisfaction.[70]

A higher unemployment rate is associated with a higher suicide rate.[71] Job loss can also lead to increased mortality risk, particularly from circulatory disease, traffic accidents, alcohol-related disease, and mental illness.[72]

Studies indicate that unemployment of an individual is linked with a decrease in their spouse's wellbeing.[73] A 2014 Australian study found that the mental wellbeing of wives declined after their husband lost his job, if he was then unemployed for a sustained period or if the couple had suffered financial hardship or relationship strain before he lost

66. McKee-Ryan et al (2005); Richardson et al (2012); Li and Toll (2021); and Cygan-Rehm et al (2017).
67. Some suggest poor mental health may cause unemployment, or that other factors could cause both poor mental health and unemployment. The research refutes this. See McKee-Ryan et al (2005), Cygan-Rehm et al (2017) and Paul and Moser (2009).
68. Assuming the data follows a normal distribution, if a person initially was at an average level of mental health, entering unemployment would push them to the bottom 30 per cent of the population.
69. McKee-Ryan et al (2005); and Richardson et al (2012).
70. Carroll (2007).
71. Botha and Nguyen (2022).
72. Browning and Heinesen (2012); and Sullivan and T. v. Wachter (2009).
73. For example, Marcus (2013).

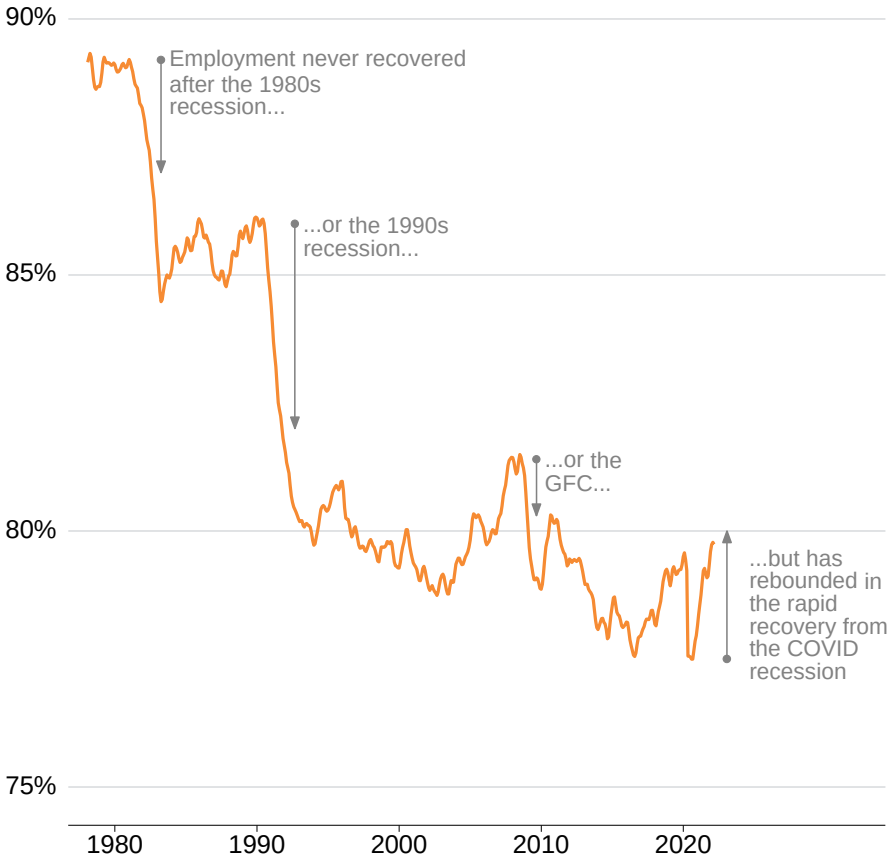
Figure 2.3: The long-term unemployed tend to leave the labour force rather than find a job
Rate of transition, 12-month-trailing average



Notes: NILF = not in the labour force. Long-term = more than 12 months. Short-term = less than 12 months. Data have been adjusted to take account of sample attrition.

Sources: Cassidy et al (2020); ABS.

Figure 2.4: During slow recoveries from recessions, many middle-aged men lose full-time work and never find it again
Percentage of men aged 35-54 in full-time employment



Note: Seasonally adjusted using the standard X13-ARIMA seasonal adjustment procedure.

Sources: ABS Labour Force – Detailed, and Grattan calculations.

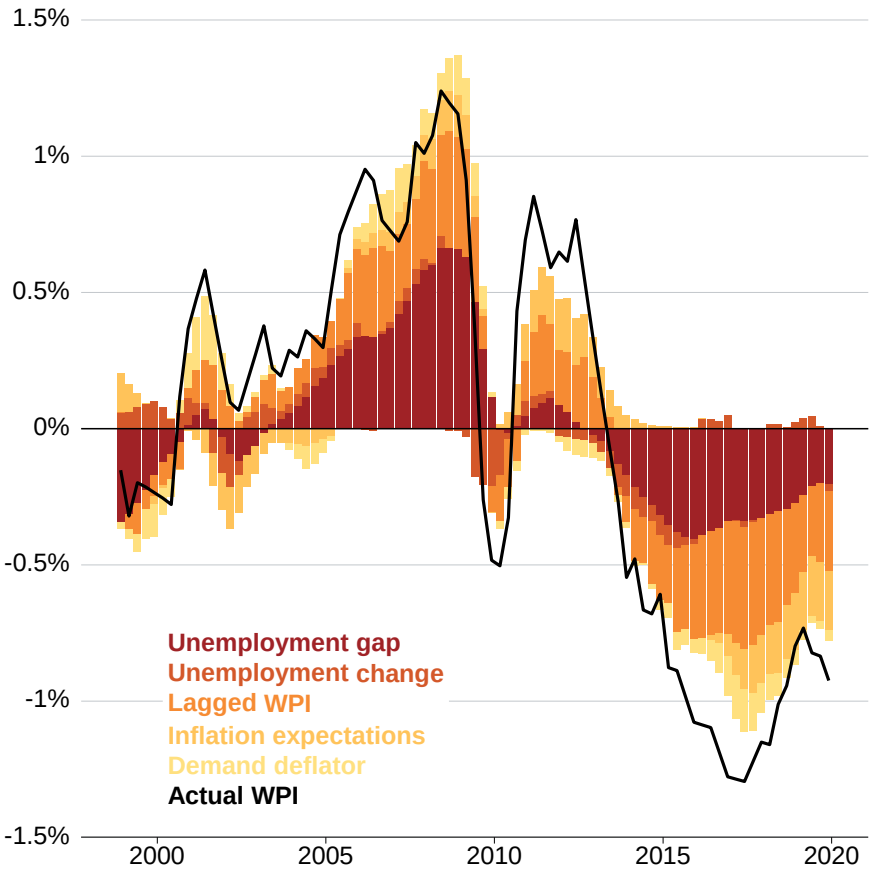
his job.[74] Unemployment also increases the incidence of domestic violence.[75]

2.4 A weak labour market also hurts those who keep their jobs

Although the burden of weak labour demand is felt most by workers who lose their jobs, all workers suffer through lower wage growth. The labour market is the main driver of wages growth, as captured by the Phillips Curve. A larger pool of unemployed workers reduces employees' bargaining power.

The unemployment gap – the difference between the unemployment rate and the NAIRU measure of full employment – captures the degree of cyclical unemployment in the labour market. A statistical model of the Phillips Curve can be used to estimate how cyclical unemployment affects wage growth.[76] Figure 2.5 shows the direct effect of the unemployment gap accounts for roughly a third of the decline in nominal wage growth between 2013 and 2019 – and that is likely to understate the impact of Australia's recent weak labour market on wages.[77] Many explanations have been given for low wage growth over that period, but it is clear in retrospect that there was substantial spare capacity in the labour market in the years before the pandemic.[78]

Figure 2.5: A weak labour market weighs on wage growth
Contributions to wage Phillips Curve model, year-ended deviations from own mean



Notes: WPI = Wage Price Index. The Phillips Curve model follows the current specification for private WPI used by the RBA, as detailed in Appendix A of Bishop and Greenland (2021), estimated over March 1998 to December 2019. Year-ended measures are four-quarter sums. The NAIRU and trend inflation expectations series are taken from the Eviews workfile for the RBA MARTIN model and assumed to be constant after March 2019.

Source: Grattan analysis of ABS WPI, LFS, National Accounts, and Ballantyne et al (2019).

74. Bubonya et al (2014).
75. Morgan and Boxall (2022); and Bhalotra et al (2021).
76. We use the private sector wage price index model used by the RBA, as detailed in Appendix A of Bishop and Greenland (2021).
77. The contributions of both lagged wages and inflation expectations to the slowdown in wages growth over this period can also be attributed in part to weak labour demand. This is particularly the case for inflation expectations, which drifted lower over the period as low wage growth persisted and the Reserve Bank undershot its inflation target for about six years.
78. Jacobs and Rush (2015); Bishop and Cassidy (2017); Arsov and Evans (2018); Weir (2018); Bishop and Chan (2019); Andrews et al (2019); and RBA (2019).

The findings are broadly consistent with recent Australian research estimating a regional wage Phillips Curve.[79] There is also evidence that moving to a new job can lead to higher wage growth. Job mobility – moving between jobs or employers – is strongly associated with wage growth in Australia.[80] While job mobility has been declining for the past 50 years, mobility is also affected by the economic cycle.[81]

A weak labour market also reduces income through the hours of work offered to employees. The under-employed accounted for a substantial share of underutilised labour in the decade prior to COVID (see Section 1.3 on page 8). With firms increasingly using hours to adjust their labour demand, under-employment is an important issue for household incomes. A reduction of just a couple of hours of work a week can have a much larger effect on income than missing out on an extra 1-to-2 per cent a year in wages growth.

A weak labour market – whether driven by the national business cycle or local conditions – weighs on wage growth and hours of work. Households that do not directly face job loss will still face reduced income when macroeconomic policy fails to achieve full employment.

2.5 Weak demand can permanently lower economic activity

Sustained periods of high unemployment also have long-lasting effects on the economy as a whole. There is now considerable evidence that prolonged recessions reduce the productive capacity of the economy in the long term.[82] Recessions are not just cyclical deviations from a stable long-run growth path – recessions themselves can affect the long-run growth path. Other things being equal, a higher unemployment rate today is likely to mean a higher unemployment rate a decade from now than would otherwise have been the case.[83]

For instance, weak demand is a leading explanation for the dearth of non-mining business investment in Australia since the GFC. Sluggish private sector investment occurred alongside stagnant wages and signs of spare capacity in the labour market. In the years after the GFC, both Treasury and the Reserve Bank expected non-mining business investment to recover and begin to grow again, as it had done in the past.[84] Instead, it flat-lined for about a decade.

Various explanations were proffered: high hurdle rates, uncertainty, debt burdens, structural factors, and more.[85] But weak demand, and the expectation that it would continue, was a major culprit.[86] This was more acute in large firms, which account for a large proportion of non-mining investment in Australia.[87] Demand was found to account for more than half of the decline in corporate investment post-GFC.[88] Low growth also accounted for about a third of the decline in non-mining business investment since 1990.[89] International evidence also supports the case.[90]

Strong demand is crucial to boosting economic activity and achieving full employment.

79. Bishop and Greenland (2021) use data on 291 local labour markets to estimate a regional wage Phillips Curve. They find that when the unemployment rate increases by 1 percentage point, annual wage growth falls by 0.2-to-0.3 percentage points on average.
80. Deutscher (2019).
81. Deutscher (2019); and ABS (2021c).
82. See a recent review of the evidence in Cerra et al (2020).
83. In the US, Yagan (2019) found that each extra percentage point of unemployment in 2007-09 reduced the employment rate by 0.3 per cent in 2015, nearly a decade later.
84. Joint Economic Forecasting Group (2015); and Lowe (2018).
85. Lane and Rosewall (2015); Lowe (2018); van der Merwe et al (2018); and Hambur and Jenner (2019).
86. Debelle (2017b); van der Merwe et al (2018); and Bell and Keating (2019).
87. Dynan (2021) finds that the top 1 per cent of firms account for about half of all non-mining investment.
88. La Cava (2021).
89. Minifie et al (2017).
90. Bachmann and Zorn (2020); and Bivens (2017).

3 Full employment benefits disadvantaged Australians the most

Recessions hit disadvantaged Australians the most. Workers who are young, less educated, have lower wages or wealth, or who are in manual jobs are much more exposed to unemployment and the business cycle. However, any individual who suffers a spell of unemployment – irrespective of who they are – faces similar financial and non-financial costs. It is in everyone's interests to push for full employment, but the worst off benefit the most.

3.1 Disadvantaged Australians spend more time unemployed

Some groups of workers have permanently higher rates of unemployment, including younger and less-educated Australians and those earning lower wages (Figure 3.1).[91]

Over the past 40 years, the chances of being unemployed have been markedly higher if you are young or less educated. Working in certain types of occupations, such as manual jobs, also leaves you more likely to face a spell of unemployment.

Workers in non-routine cognitive occupations are three times less likely to be unemployed than those in non-routine manual occupations (Figure 3.1).[92] Workers in low-paying jobs, or in households with low net worth, are 3-to-4 times more likely to be unemployed than wealthier households. The pattern is repeated in the length of unemployment spells: less-skilled and lower-wage workers spend more time unemployed than higher-skilled, higher-wage workers.[93] The same groups are also more likely to experience underemployment.[94]

The explanation for these results could go either way: workers may find themselves in low-paying jobs because of their unemployment history, or low-paying jobs may be more insecure. But the data clearly show that workers who are already at a disadvantage – in terms of education, experience, wealth, wage, or type of work – spend much more time unemployed.

3.2 Disadvantaged Australians benefit most from a strong economy

Lower unemployment is a clear win for all households. But some groups benefit much more than others. In fact, those same groups of disadvantaged Australians that spend more time unemployed stand to benefit the most from full employment.

Overall, the data paint a striking picture – low-wealth and low-wage households bear the weight of downturns and have the most to gain from a strong economy. Good macroeconomic policy could help reverse the course of rising income inequality and wealth inequality in Australia.[95]

91. See Borland and Kennedy (1998).
92. Occupations are split into whether they require manual or cognitive tasks, and whether they are rules-based (routine) or require adaptation and problem-solving (non-routine). Routine manual occupations include labourers and machinery operators in manufacturing and construction; non-routine cognitive occupations include management and professional occupations. See Coelli and Borland (2016), Cassidy and Parsons (2017), Autor et al (2003), and **??**.
93. A key exception is the length of spells by age groups. Young workers have average unemployment spells of 5.7 months, whereas workers aged 55-64 have average spells of 9 months.
94. Wilkins (2006).
95. Wood et al (2022, pp. 21–22).

3.2.1 Unemployment among disadvantaged groups falls by more as national unemployment declines

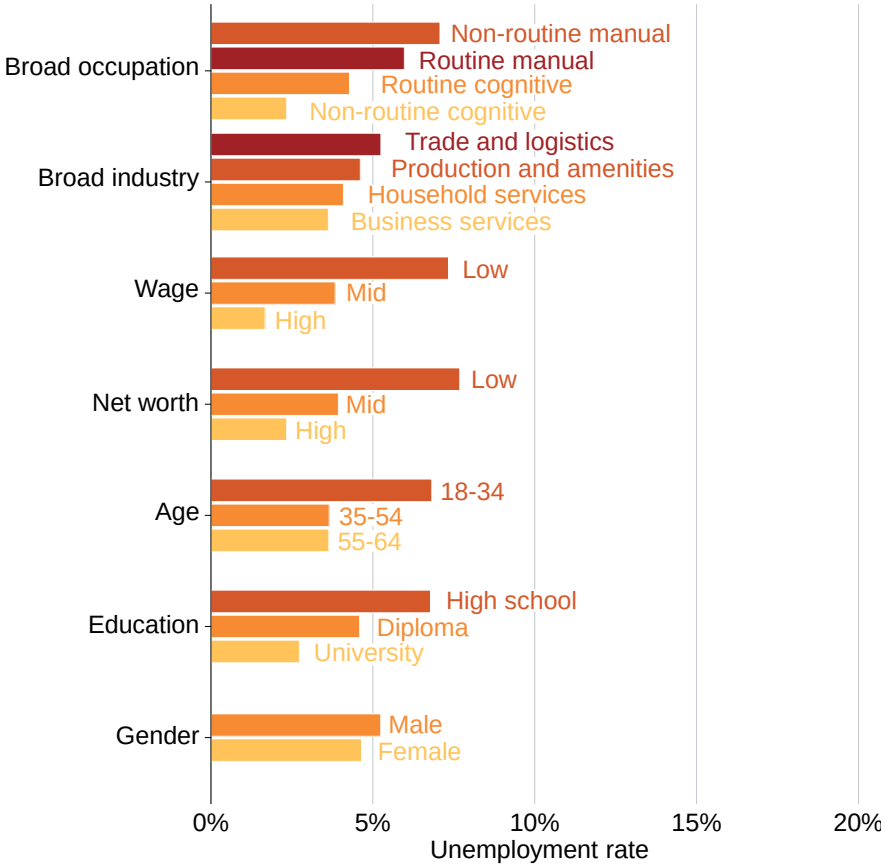
The HILDA survey provides a unique dataset to assess who is hurt most when the unemployment rate is high, and who gains most when it is low. HILDA collects employment calendars for every responding person, which document whether the person was employed, unemployed, or not looking for work in each month of the most recent financial year. These can be used to construct month-by-month unemployment rates for each responding person, which can be compared against the national unemployment rate.[96] The sample covers July 2000 until June 2020, which includes the early-2000s 'tech bubble', the Global Financial Crisis (GFC), the 2010s stagnation after the mining boom, and a small part of the COVID-19 pandemic.[97]

Figure 3.2 shows how groups with higher overall rates of unemployment have larger reductions in their unemployment rates when the national rate falls. The differences are statistically significant for low-wage and low-wealth groups, those with only high school education, those in manual jobs, as well as younger and older aged groups (compared to those aged 35-54).[98]

For example, the probability of unemployment for workers with TAFE, Diploma, or University education decreases by about 0.6 percentage points for every 1 percentage-point reduction in the national unemployment rate. For workers with high school education or less,

Figure 3.1: The most disadvantaged groups have higher unemployment rates

Average unemployment rate, population weighted



Notes: Average share of time spent unemployed (derived from employment calendars) across all HILDA waves from 2001 to 2020. Weighted by the cross-sectional responding person weights. Sample restricted to people younger than 65 and not retired.

Source: Grattan analysis of HILDA Release 20.0.

96. See Appendix B.
97. These events had a relatively small effect on the labour market compared with recessions in the 1980s and early-1990s. In part, this can be attributed to the success of macroeconomic policy; for example, see Gross (2022). But there is some evidence of the same pattern during the earlier downturns, particularly for younger workers.
98. See Appendix B for details. The effects are also larger and statistically significant for workers born in a non-English-speaking country; however, HILDA does not accurately reflect the current composition of migrant workers (Sherrell (2019)).

the decrease is about 1.15 percentage points. The difference is largest for workers with low wealth. Their decrease is 1.7 percentage points – a full percentage point more than those in the middle of the wealth distribution and 1.5 percentage points more than high-wealth workers.

3.2.2 Low-wage and low-wealth workers have the most to gain from low unemployment

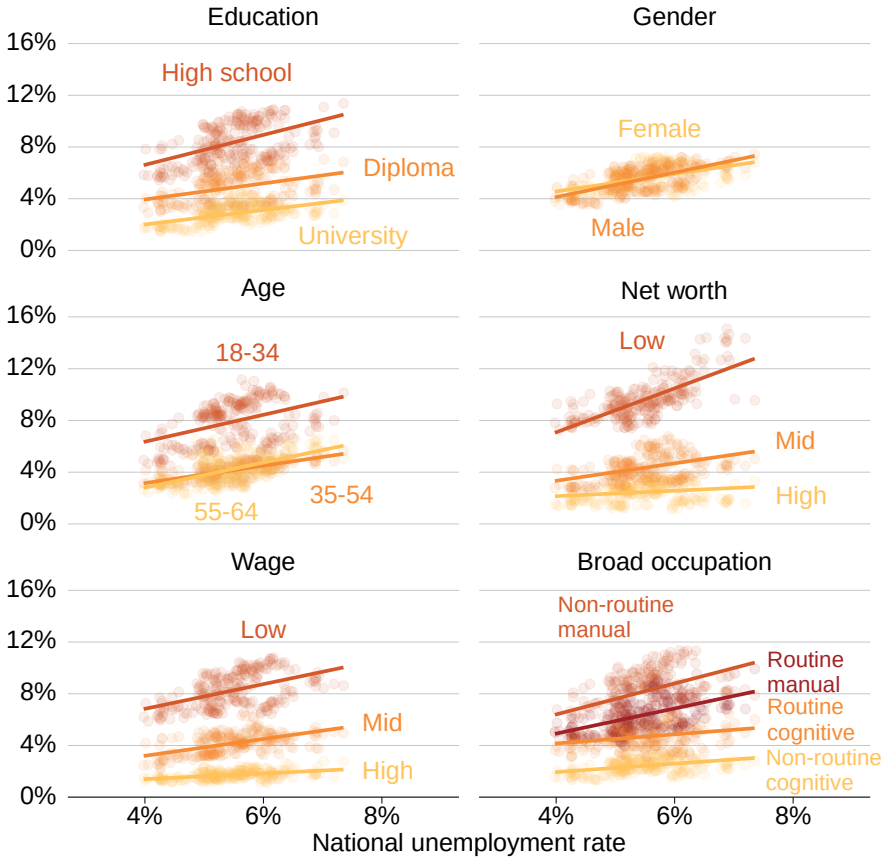
However, the analysis above has limitations. While informative, correlations of unemployment across groups as in Figure 3.2 alone cannot tell us which of the various factors are the main drivers of higher unemployment rates or higher risk of becoming unemployed during a downturn.

We further separate between the groups to identify which are most closely associated with national unemployment, holding other factors constant.[99] This provides important insight because groups have overlapping membership; for example, the life-cycle profile of earnings means that older workers are more likely to have higher wages and higher wealth.

Our modelling finds that university-educated workers are just as exposed to the business cycle as otherwise similar workers with only high school education (Figure 3.3).[100]

But the results for low-wealth and low-wage workers are most striking. The probability of unemployment decreases by 1.3 percentage-points for low-wealth workers and 1.2 percentage-points for low-wage workers. In contrast, the decrease is only 0.45-to-0.62 percentage-points for all other workers.

Figure 3.2: Disadvantaged groups benefit most when national unemployment falls
Group-specific unemployment rate against national rate, monthly



Notes: Each dot represents the monthly unemployment rate from July 2000 to June 2020. Group-specific unemployment rates are derived from HILDA employment calendars, weighted by the cross-sectional responding person weights, and seasonally adjusted using X-13ARIMA-SEATS.

Source: Grattan analysis of HILDA Release 20.0 and ABS LFS.

99. We model individuals' monthly unemployment using interactions between group membership and the national unemployment rate as explanatory variables, and controlling for individual unobserved heterogeneity (see Appendix B for details).
100. This does not mean they have the same *overall* probability of unemployment, it just means they have the same *sensitivity* to the cycle.

Low-wealth and low-wage workers carry more of the burden of downturns, and have the most to gain from a full employment economy.

3.2.3 Poorer households benefit most when the economy is growing strongly

When the economy grows strongly, poorer Australians get the biggest lift in their hours worked, total employment, and labour income.

We model the response of labour market outcomes to changes in real GDP growth, extending the model used in Section 2.2 to capture different effects across the wage and wealth distribution.[101] Low-wealth and low-wage workers gain bigger improvements across all outcomes as the economy grows, compared to well-off workers (Figure 3.4).[102]

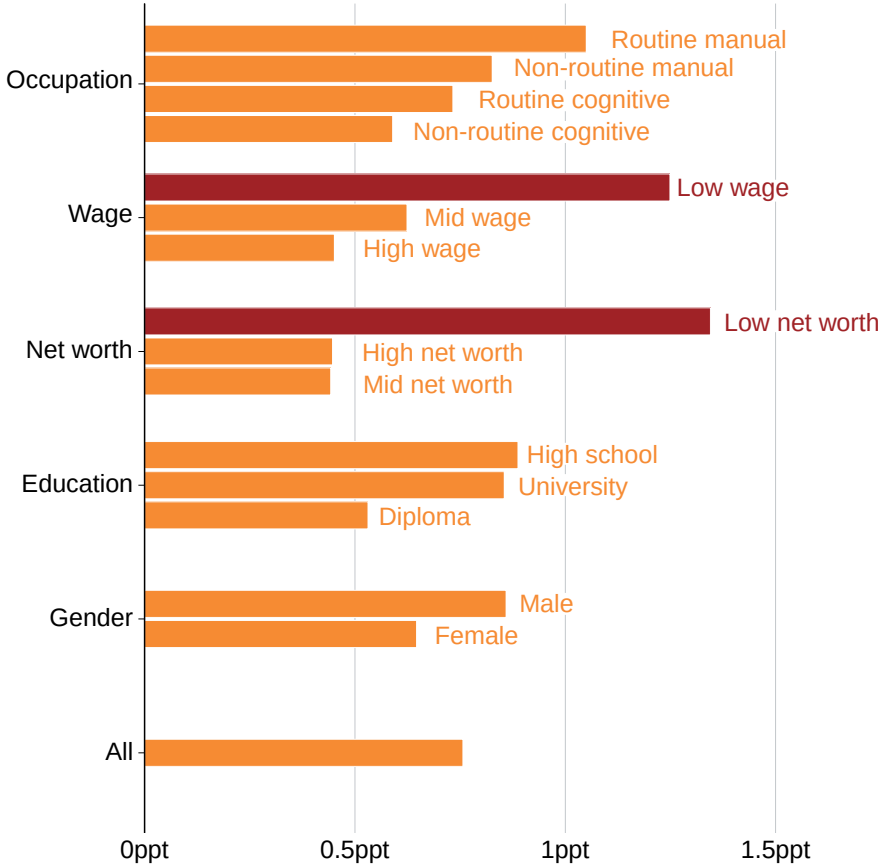
The poorest 20 per cent of workers gain a full percentage point reduction in unemployment in response to a 1 percentage point increase in real GDP growth. This is about three times higher than the average. The lift in weekly hours worked is also 1.5-to-1.75 times higher for the poorest 20 per cent than for the wealthiest 20 per cent. Changing between part-time and full-time work probably explains this result.[103]

The combined effect of higher employment, more hours, and higher rates of hourly pay resulting from a strong economy has a much larger impact on poorer households. Low-wage and low-wealth workers benefit from larger gains in real labour income when the economy is growing strongly (Figure 3.4). The result is particularly stark for the poorest quintile, who gain 2.5-to-3 times larger increases as the average. That represents a huge boost in livelihoods for about 2.5 millions workers.

101. See Appendix C for details.
102. Although some differences may not be statistically significant, only poorer workers tend to have responses that are statistically different to zero across all outcomes.
103. Bishop et al (2016).

Figure 3.3: Low-wage and low-wealth workers' risk of becoming unemployed falls by the most when national unemployment declines

Decrease in the probability of becoming unemployed for each 1 percentage-point decrease in the national unemployment rate



Notes: Estimates are from the model described in Appendix B. Bars are the average marginal effect of a 1 percentage-point decrease in the national unemployment rate. The red bars are statistically significant differences to the base groups (male, TAFE or Diploma, middle wealth and wage terciles, and routine cognitive occupation) at the 1 per cent threshold.

Source: Grattan analysis of HILDA Release 20.0 and ABS LFS.

3.3 All Australians suffer a similar setback from a spell of unemployment

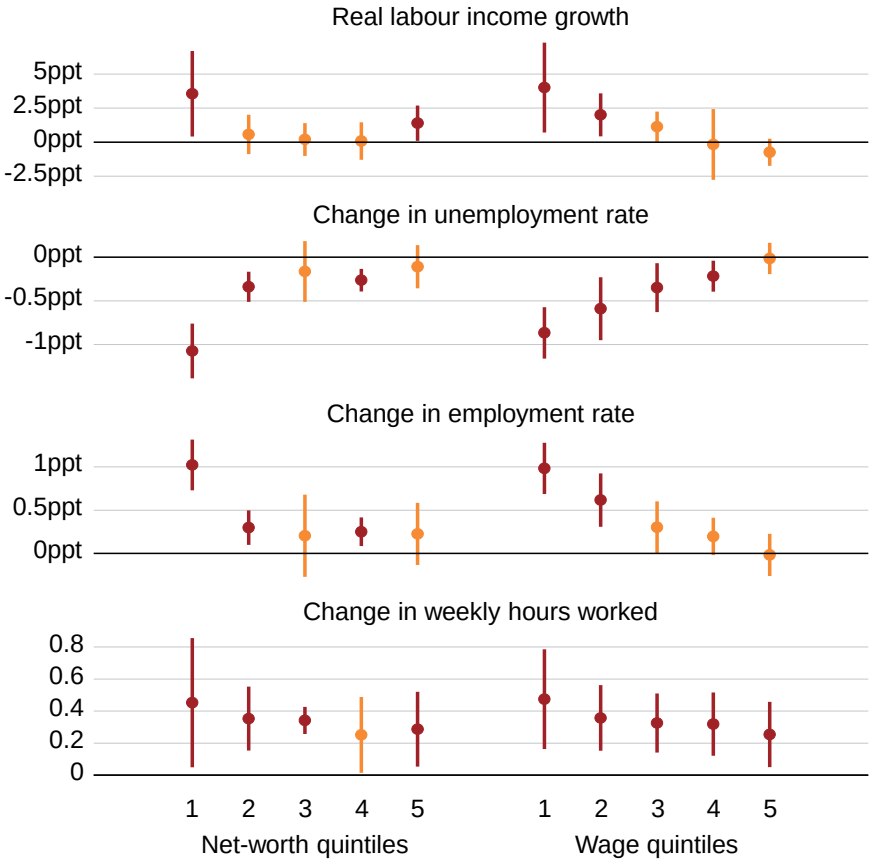
All workers suffer a similar fall in income when they become unemployed.

A spell of unemployment has a persistent impact on the incomes of all Australians, irrespective of their age, earnings, wealth, occupation, or gender (Figure 3.5).[104] They suffer similar percentage reductions in labour income (relative to their pre-unemployment earnings) at the time of unemployment and for years afterwards.

The results are perhaps surprising given the evidence presented above on variation across groups. Of course, high-income or high-wealth workers will not feel the same financial pain of unemployment as poorer workers if they have savings or alternate income streams to use. In contrast, a 25 per cent fall in earnings requires a large drop in spending for a worker who lives paycheck to paycheck.

The non-financial costs of unemployment described in Section 2.3.2 also affect most workers in similar ways. Income and wealth does not make someone immune. The length of time spent unemployed tends to increase the effects on mental health, underscoring the importance of quick recoveries.[105] Financial strain, irrespective of a worker's level of income, is also associated with worse mental health among the unemployed.[106]

Figure 3.4: Low-wage and low-wealth workers earn more when the economy grows
Change in labour market outcomes for a 1 percentage point increase in GDP growth



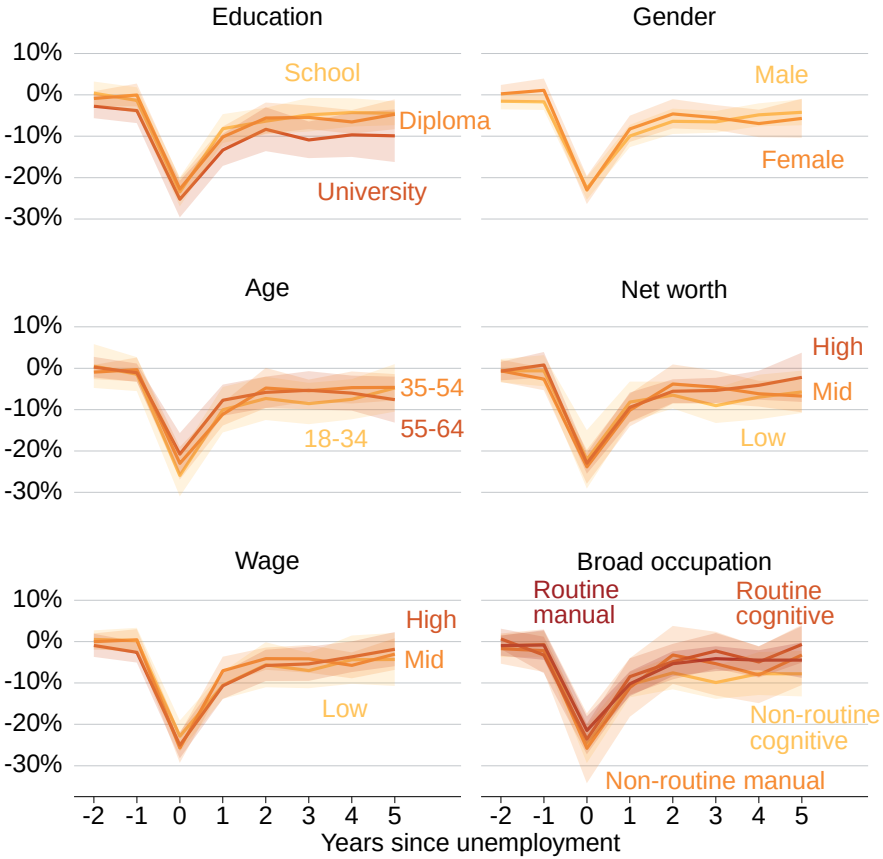
Notes: Estimates are from the model described in Appendix C. The dots are point estimates and lines are two-standard-error bands. Red dots and lines are statistically significant at the 10 per cent threshold.

Source: Grattan analysis of HILDA Release 20.0, and ABS 5206.0 and 6401.0.

104. Unlike the earlier model of income loss presented in Figure 2.2, this model does not distinguish between first and subsequent spells, so as to preserve sufficient observations in each group. See Appendix A.
105. McKee-Ryan et al (2005); and Cygan-Rehm et al (2017).
106. McKee-Ryan et al (2005).

Figure 3.5: The effect of unemployment on labour income is similar across households

Percentage reduction in labour income due to three months of unemployment



Notes: Estimates are shown as percentage changes relative to average labour income in the year before unemployment. They are derived from a regression of labour income on unemployment, taking account of factors that affect income over the life cycle. Shaded regions are two-standard-error bands. For details, see Appendix A.

Source: Grattan analysis of HILDA Release 20.0.

Box 3: Indigenous Australians also benefit from low unemployment

Indigenous Australians carry an economic burden heavier than gender, age, education, region, or wealth. But the burden is not just economic; it is felt across so many areas of Indigenous Australians' lives: health, education, crime, mental health.[a]

Report after report shows that the quality of life of Indigenous Australians is not catching up to that of non-Indigenous Australians.[b] Indigenous Australians show enormous resilience, but the failure of policy to close the gap is felt every day.

The main barriers to improving the economic lives of Indigenous Australians are structural. But Indigenous Australians also benefit from a full-employment economy. The unemployment rate of Indigenous workers rises and falls with the national rate (Figure 3.6).[c] And a period of low unemployment could help Indigenous workers to build experience and skills that would improve their future prospects.

Figure 3.6: Indigenous Australians have much higher unemployment rates than non-Indigenous Australians

Group-specific unemployment rate against national rate, monthly

Notes: Each dot represents the monthly unemployment rate from July 2000 until June 2020. Group-specific unemployment rates are derived from HILDA employment calendars, weighted by the cross-sectional responding person weights, and seasonally adjusted using X-13ARIMA-SEATS. Due to the small sample, the standard errors of estimates for Indigenous unemployment rates average 3 percentage points, about 10 times those for non-Indigenous estimates.

Source: Grattan analysis of HILDA Release 20.0 and ABS 6202.0.

a. Commonwealth of Australia (2022); ABS (2018); Goss (2018); Commonwealth of Australia (2017); and Colleen Bryant (2009).
b. Commonwealth of Australia (2020); Commonwealth of Australia (2018); Commonwealth of Australia (2015); and Commonwealth of Australia (2011).
c. The relatively small sample in HILDA means that estimates are uncertain, but the large variation may also be driven by factors unique to Indigenous Australians.

Appendix A: Estimates of income sensitivity to unemployment

Chapter 2 presents estimates of the impact on income of periods of unemployment (Figure 2.2). In Chapter 3, similar estimates are shown for various groups (Figure 3.5). This appendix describes the methodology behind those estimates.

Past studies tend to find large reductions in income – in the range of 10-to-30 per cent – for workers five years after job loss, but those studies are mostly conducted on administrative datasets from other countries.[107] This literature has focused on 'mass layoff' events, such as plant closures, by linking person-level data with firm-level data. Our approach does not focus on such events and so, without an exogenous unemployment shock, the estimates are not causal.[108]

Our approach is similar to a 'difference-in-differences' design, which relies on measuring the effect of a 'treatment' (unemployment) in reference to a control group. The choice of control group has been shown to matter for the size and persistence of the measured effect.[109] Selecting a control (and treatment) group that has a period of continuous employment both before and after the job loss or mass layoff tends to result in larger and more persistent estimates.

But a spell of unemployment is often not an isolated event – workers can suffer multiple spells even within a single year.[110] A worker's labour market history affects their future chance of becoming unemployed and so also their labour income.[111] In fact, a large share of the persistent reduction in income after a job loss arises due to a higher likelihood of unemployment.[112] Including workers who have unemployment histories in the control group biases the estimates and will tend to decrease the size of the effects. This is shown in Figure A.1.[113] Capturing only the first observed spell of unemployment (which is effectively what the 'mass layoff' literature does) will capture the *total effect* on income. But controlling for subsequent spells of unemployment or of not being in the labour force (NILF) will help to identify the *partial effect* of different spells on labour income.

We use the Household, Income, and Labour Dynamics in Australia (HILDA) survey rather than an administrative dataset. This presents some limitations and some advantages. We are not able to match individuals to employers so cannot identify exogenous employment shocks. Employment status is measured at the time of interview, while the best measure of labour income is for the recently ended financial year. Employment transitions between years are a comparison of two point-in-time measures, which greatly abstracts from the multitude of potential changes that could occur within the year.[114] However, the employment calendars offer a full history of a respondent's employment status three times a month. This is a much richer source of information, which is used to construct a variable in HILDA that captures the percentage of time spent employed, unemployed, or not in the labour force, during the financial year.

We estimate the labour income loss associated with the first observed spell of unemployment, controlling for the effect of subsequent periods of unemployment or of not being in the labour force. This

107. Jacobson et al (1993); Krolikowski (2018); and Bertheau et al (2022).
108. The same caveat applies to the other recent Australian study (Lancaster (2021)).
109. Krolikowski (2018).
110. Akerlof and Main (1980).
111. Arulampalam et al (2001); and Borland and Johnston (2010).
112. Bertheau et al (2022).
113. See Cinelli et al (2022) for an introduction to econometric controls using causal diagrams.
114. This is acknowledged in Lancaster (2021), who looks to control for the effects of transition timing with quarter-specific dummies.

choice eliminates workers with prior unemployment histories in the control group.[115] We also opt to measure the effect of time spent in unemployment within a financial year, rather than a job displacement event, because this better aligns with financial year income. This choice is a substantial departure from the literature. We believe it results in more informative estimates. The baseline result of a 26 per cent reduction in labour income in the same financial year as three months of unemployment is intuitive and aligns with our expectations. In addition, there is no pre-treatment effect of a reduction in income prior to unemployment.

The model is given by

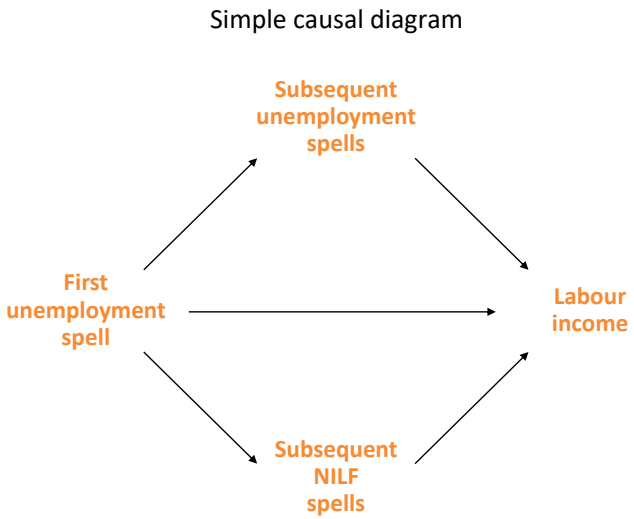
$$Y_{i,t} = \alpha_i + \delta_t + \sum_{j=-2}^{5} \gamma_j^F first_{i,t-j} + \sum_{j=0}^{4} \gamma_j^S sub_{i,t-j} + \sum_{j=0}^{5} \gamma_j^N nilf_{i,t-j} + X_{i,t}\beta + \varepsilon_{i,t}, \quad \text{(A.1)}$$

where $Y_{i,t}$ is nominal labour income of individual i in financial year ending t, $first_{i,t}$ is the number of months spent in unemployment in the financial year for the first observed spell, $sub_{i,t}$ is that of subsequent unemployment spells, $nilf_{i,t}$ is that of subsequent or concurrent spells of not being in the labour force, α_i and δ_t are individual and time fixed effects, and $X_{i,t}$ is a vector of control variables. The set of control variables includes age and age-squared interacted with a detailed measure of education, and a binary variable for whether the individual has ever reported being not in the labour force.[116] The coefficients of interest are γ_j^F, which capture the effect of one month of unemployment in the first spell in financial year $t - j$

115. Forbes and Barker (2017) also use only the first observed spell of unemployment in a hazard model of duration.

116. The measure of education includes postgraduate, graduate diploma/certificate, bachelors, diploma, certificate, Year 12, less than Year 12, and undetermined.

Figure A.1: Controlling for subsequent spells of unemployment and of not being in the labour force (NILF) is important for inference



on labour income in financial year t. The coefficients γ_j^S provide similar measures for subsequent spells of unemployment, and γ_j^N for subsequent or concurrent spells of not being in the labour force.

We transform the estimates into percentage-change reductions relative to the pre-treatment level of labour income for the treatment group in $t-1$.[117] However, labour income grows over time, and the estimates reflect the effect in 2007 dollars (which is the base year of the time fixed effects). So we use a measure of income deflated to 2007 dollars (using the sample yearly means) for the transformation. The estimates are scaled up to reflect a spell of three months.[118] Standard errors are clustered by individual and year. Estimates are reported in Table A.1 for the main model, and a version that captures the total effect by removing the subsequent unemployment and NILF spell variables.[119]

We use data at the responding person level from HILDA over 2001 to 2020. The selection of the sample plays a large role in determining the estimated effects, because it defines the control group. The filtering process is layered because the interaction of employment, unemployment, and NILF is nuanced. We focus on employees (not self-employed or working in family business) aged 18-64 who are not retired. We remove anyone who has ever been NILF for more than three months in a financial year, except if they were engaged in full-time education and except if this occurs in the same (or subsequent) financial year as the first observed unemployment spell. This ensures that the control group is not affected by NILF spells, and also allows us

117. A similar approach is used by Bertheau et al (2022).
118. The sample average length of first unemployment spells is 2.9 months (from 689 observations), subsequent unemployment spells is 4.5 months (from 977 observations), and subsequent spells of not being in the labour force is 6.1 months (from 1101 observations).
119. The model is estimated by ordinary least squares, but other estimators may be preferable given the substantial right skew of labour income.

Table A.1: Regression results

Dependent Variable:	Labour income			
Model:	Partial effects		Total effects	
Unemployment and NILF spells				
First: -2	-366.7*	(189.8)	-332.5	(227.6)
First: -1	-381.5	(249.6)	-202.8	(260.5)
First: 0	-5,042.2***	(347.2)	-5,014.5***	(401.4)
First: 1	-3,079.2***	(387.2)	-4,770.5***	(397.8)
First: 2	-2,233.7***	(439.2)	-3,423.7***	(475.0)
First: 3	-2,565.9***	(416.9)	-3,757.8***	(444.6)
First: 4	-2,352.9***	(435.3)	-3,629.1***	(440.1)
First: 5	-2,171.1***	(549.1)	-3,553.7***	(501.0)
Subsequent: 0	-3,841.4***	(258.4)		
Subsequent: 1	-1,063.7***	(198.5)		
Subsequent: 2	-614.4**	(239.6)		
Subsequent: 3	-533.8*	(253.8)		
Subsequent: 4	-818.1**	(312.2)		
NILF: 0	-3,498.0***	(256.2)		
NILF: 1	-821.2***	(155.9)		
NILF: 2	-556.8***	(137.6)		
NILF: 3	-506.6**	(198.1)		
NILF: 4	-646.9***	(175.2)		
NILF: 5	-443.3	(277.1)		
Fixed-effects				
Individual	Yes		Yes	
Year	Yes		Yes	
Fit statistics				
Observations	33,097		33,097	
R^2	0.87030		0.86584	
Within R^2	0.10269		0.07184	

Notes: Standard errors clustered by individual and year are shown in parentheses.
**** p < 0.01; ** p < 0.05; * p < 0.10.*

to capture the possibility that unemployment has led someone to leave the labour force.

The sample consists of observations of employed people with no observed unemployment history (the control group) and people with unemployment spells (the treatment group). Employed observations are counted if the person was employed for more than nine months (75 per cent) of the financial year. We use only the first five years following the first observed spell of unemployment (as well as the year the spell begins) for the treatment group. This ensures that there are no previously treated people in the control group.

We do additional filtering to eliminate inconsistent labour market outcomes. We drop observations where labour income is zero but individuals report being employed during the year, as well as observations with positive labour income but individuals report being unemployed or NILF for the full year (or report no employment in the year). Including the two leads of the first spell of unemployment shows that there is no pre-treatment effect. This implicitly restricts the treatment group to those who have been employed for two years prior; however, the results are very similar if this restriction is removed.

The analysis by groups (Figure 3.5) uses a modified model to preserve sufficient observations within each group. This model does not distinguish between first and subsequent unemployment spells (so the estimates reflect a weighted average of the effects).

HILDA contains questions which can be used to create an indicator of people who involuntarily stopped working, say by being fired or retrenched (although the timing does not accord neatly with the financial-year measures of unemployment). Extending the model to account for this finds little difference in the income-loss profile between involuntarily unemployment and other reasons for unemployment. This finding is consistent with Lancaster (2021).

Our estimates help to explain the less persistent effect found by Lancaster (ibid). His estimates reflect the average labour income loss of *any* job loss compared to anyone who did not lose a job within the past five years or does not lose a job within two subsequent years. This does not distinguish between the first and subsequent spells of unemployment, which we find have different effects on income, and uses a control group that may still be affected by the long shadow of a prior job loss. Both of these choices lead to less persistent effects and a different economic interpretation of the estimates. The Lancaster (ibid) estimates are effectively the expected income loss due to any job displacement. Our estimates are the expected income loss for a particular length of unemployment.

Appendix B: Estimates of the sensitivity to the business cycle of unemployment for particular groups

Chapter 3 presents analysis showing which groups have the largest increases in unemployment in response to an increase in the national unemployment rate (Figures 3.2 and 3.3). This appendix describes the methodology behind those estimates.

The detailed employment calendars available in HILDA provide a rich source of labour market histories that have been used in previous research.[120] Respondents are asked about their labour force status for the beginning, middle, and end of each month back to the start of the previous financial year. The questions align well with those used by the ABS in constructing the Labour Force Survey.[121]

We construct monthly unemployment rates for each person, using the employment calendar responses for the previous financial year.[122] We use these individual unemployment rates to construct group-specific unemployment rates, removing all observations where people report a full month of NILF or report being retired. The responding person weights are used so that estimates are representative of the population (with a correction for the missing employment calendars of the 2011 top-up sample). The monthly group unemployment rates are seasonally adjusted using the default X-13ARIMA-SEATS method of the R package `seasonal()`.[123] The results for the full sample show that the HILDA measure captures key parts of the cycle in the ABS measure (Figure B.1).

Although the monthly measure includes more statistical 'noise' than annual measures, it contains 12 times as many observations, which greatly increases the precision of estimates. We estimate the response of group-specific unemployment to the national unemployment rate to capture the excess sensitivity of groups to the cycle (similar to a 'beta coefficient' in finance).

An initial assessment is provided by simple regressions that pool group-specific unemployment rates constructed from a single characteristic (e.g. education) and regress them on the national rate interacted with group dummy variables.[124] These regressions show larger sensitivity of manual occupations, low-wage and low-wealth workers, and those with high school education only. People aged 35-54 have smaller sensitivity. All of these differences are statistically significant at 1 per cent.

Because there is substantial overlap of group membership – for example, high-wealth households are typically older – it is not clear which of these characteristics is the dominant driver. To separate the factors we build a model of individuals' monthly unemployment using interactions between group membership and the national unemployment rate as explanatory variables, and controlling for individual unobserved heterogeneity.

The model is given by

$$u_{i,t} = \alpha_i + \sum_g \gamma_g D^g_{i,t} U_t + \sum_g \psi_g D^g_{i,t} + \varepsilon_{i,t}, \qquad \text{(B.1)}$$

120. Borland and Johnston (2010); Baxter and Renda (2011); Forbes and Barker (2017); and Bubonya et al (2019).
121. Unemployment is captured by 'have you been not employed BUT looking for work?', and NILF is captured by 'have you been not employed and not looking for work?'.
122. The measure captures the share of the month each person was unemployed, but results are very similar using a threshold approach to measure monthly unemployment as a binary variable (since less than 1 per cent of observations are fractions).
123. Sax and Eddelbuettel (2018).
124. This is identical to separately regressing a group-specific unemployment rate on the national rate and a constant, but allows for easier statistical comparison of coefficients.

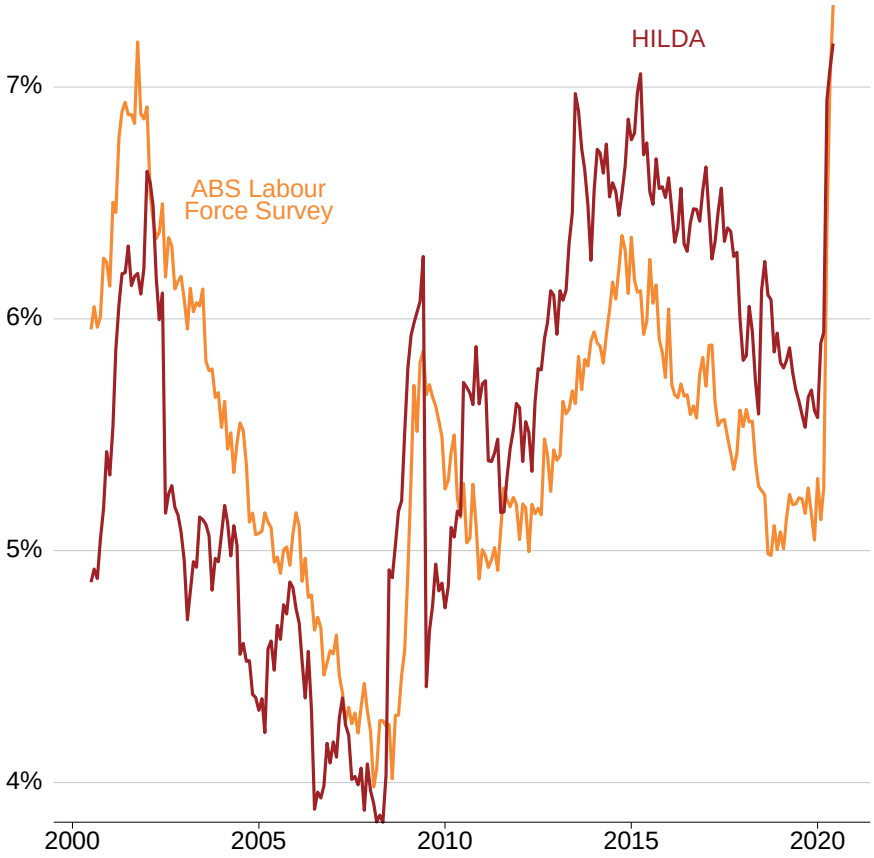
where $u_{i,t}$ is the unemployment rate of individual i in month t, α_i are individual fixed effects, U_t is the national monthly unemployment rate, and $D^g_{i,t}$ is a binary indicator for membership of group g. The coefficients of interest are γ_g, which capture the effect of a 1 percentage-point change in the national monthly unemployment rate on the unemployment rate of an individual in group g. This is interpreted as a change in the marginal probability of unemployment.[125]

The list of groups used is as follows.

- Gender: male and female.
- Education: high school, diploma or certificate, and university.
- Age and age-squared (these enter as continuous variables, not binary).
- Aboriginal or Torres Straight Islander person, and non-Indigenous.
- Net-worth terciles.
- Wage terciles.
- Industry: production and amenities, trade and logistics, business services, and household services.[126]
- Occupation: non-routine cognitive, non-routine manual, routine cognitive, and routine manual.[127]

125. A probit or logit model could be used instead of a linear specification; however, the 'perfect prediction' problem results in a loss of efficiency.
126. The measure of broad industry follows Manalo and Orsmond (2013). The one-digit ANZSIC 2006 divisions are given by letters in parenthesis: production and amenities (A-E), trade and logistics (F,G,I), business services (J-N), and household services (H,O-S).
127. The measure of broad occupation follows Autor et al (2003) and Borland and Coelli (2022). The two-digit ANZSCO 2006 divisions are given by numbers in parentheses: non-routine cognitive (10-14, 20-27, 30-31), non-routine manual (35, 40-45, 81, 85), routine cognitive (50-63), and routine manual (32-34, 36-39, 70-80, 82-84, 89).

Figure B.1: The monthly unemployment rate from HILDA captures key parts of the business cycle
Unemployment rate



Note: The monthly unemployment rate from HILDA is derived from employment calendars, weighted by the cross-sectional responding person weights, and seasonally adjusted using X-13ARIMA-SEATS.

Source: Grattan analysis of HILDA Release 20.0 and ABS LFS.

- State: six states and two territories.
- Employee, and self-employed or unpaid family worker.

The dummies for net worth, wage, industry, and occupation are the modal value over individual year-specific outcomes.

Our measure of occupation groups based on two-digit ANZSCO 2006 divisions follows Borland and Coelli (2022). However, the classification of certain jobs can make a substantial difference to the outcomes, because some of these are also very cyclical occupations. Technical and construction trades jobs (32-34, 39) and skilled outdoor workers (36) are classified as routine manual occupations, and food preparation assistants (85) and cleaners (81) as non-routine manual. Using the one-digit ANZSCO 2006 divisions to approximate the Borland and Coelli (ibid) classification finds that routine manual occupations (instead of non-routine manual occupations) have higher unemployment rates and are most sensitive to the business cycle.

Standard errors are clustered by individual, wealth tercile, and wage tercile, to account for the presence of cross-sectional correlation across individuals within terciles. This helps to ensure that the standard errors for the key results are not driven by fundamentally different unemployment shocks across groups. Results are shown in Table B.1.[128]

The results are similar for a model of individual unemployment response to local labour markets. We conduct a similar analysis, but using the financial-year average unemployment rate for the 291 local labour markets constructed by Bishop and Greenland (2021). These local labour markets are combinations of small regions (ABS Statistical

128. Booth et al (2012) find evidence of significant labour-market discrimination in Australia across ethnic groups. This may affect the level of unemployment, but our results suggest that people born in a non-English-speaking country are not more responsive to the cycle when controlling for other factors.

Table B.1: Regression results

Dependent Variable:	Individual unemployment	
National unemployment rate interacted with:		
Female	-0.2131	(0.3294)
High school	0.3566	(0.2476)
University	0.3239	(0.2322)
Age	0.0277	(0.0448)
Age squared	-0.0002	(0.0004)
Indigenous	0.6097	(0.4571)
High net worth	-0.0047	(0.1703)
Low net worth	0.8982***	(0.0518)
High wage	-0.1727	(0.1579)
Low wage	0.6250***	(0.2224)
Production and amenities	0.0997	(0.2576)
Trade and logistics	-0.0085	(0.2135)
Business services	0.2792	(0.4559)
Non-routine cognitive	-0.1431	(0.2290)
Non-routine manual	0.0934	(0.5217)
Routine manual	0.3170	(0.3281)
VIC	0.2183***	(0.0698)
QLD	0.5306***	(0.0740)
SA	0.1028	(0.1416)
WA	0.2902*	(0.1640)
TAS	0.0972	(0.3544)
NT	1.216**	(0.5044)
ACT	0.3410**	(0.1571)
Self-employed	-0.7396	(0.6087)
Non-English-speaking country	-0.0619	(0.3489)
Individual fixed-effects	Yes	
Observations	2,217,497	
R^2	0.31249	
Within R^2	0.00578	

Notes: Standard errors clustered by individual, wealth tercile, and wage tercile are shown in parentheses.
**** p < 0.01; ** p < 0.05; * p < 0.10.*

Areas Level 2) that capture strong commuting patterns.[129] The model is given by

$$u_{i,j,t} = \alpha_i + \nu_j + \delta_t + \sum_g \gamma_g D^g_{i,j,t} U_{j,t} + \sum_g \psi_g D^g_{i,j,t} + \varepsilon_{i,j,t}, \quad \text{(B.2)}$$

where all variables are as above, except they are indexed for local labour market j and the unemployment rate $U_{j,t}$ is specific to the local labour market. The time period is financial year. The results are similar, with low-wealth and low-wage households standing out. The size of all coefficients is smaller, reflecting an overall lower correlation between individual unemployment and local labour markets. However, when clustering standard errors on net worth and wage terciles, only the low wealth interaction term retains significance at the 10 per cent threshold. This suggests that the unemployment shocks faced by low-wealth (or low-wage) individuals are so correlated that the sample cannot provide precise estimates of the effects.

129. They have a mean population of 74,000 and a mean area of 26,000km^2. See: Appendix B of Bishop and Greenland (2021).

Appendix C: Estimates of labour and income sensitivity to the business cycle

Chapter 3 presents analysis showing how hours, employment, and real labour income respond to real GDP growth for different groups (Figure 3.4). This appendix describes the methodology behind those estimates.

Income can fluctuate for a range of reasons, many of which are idiosyncratic or follow predictable patterns over the life cycle. To understand the effect of the business cycle on an individual's income, we need to isolate the cyclical effects from all other drivers of income. We follow Cervini-Plá et al (2015) and Stone (2016) to estimate the sensitivity of individual real income growth to real GDP growth. This effectively assumes that GDP growth is a proxy for the business cycle.[130]

The model is given by

$$y_{i,t} = \alpha_i + \phi_k + \theta_l + \sum_{q=1}^{5} \gamma_q D_{i,t}^q gdp_t + X_{i,t}\beta + \varepsilon_{i,t}, \qquad \text{(C.1)}$$

where $y_{i,t}$ is real labour income growth of individual i in financial year ending t, gdp_t is real GDP growth in the financial year, $D_{i,t}^q$ is a binary variable that indicates the wealth or wage quintile q of the individual, α_i, ϕ_k, and θ_l are individual, state, and industry fixed effects, and $X_{i,t}$ is a vector of control variables. The wealth and wage quintiles are measured as the modal value of year-specific quintiles.[131]

The set of control variables includes age and age-squared interacted with a detailed measure of education, a set of binary variables for marital status, a set of binary variables for the year-specific wage quintile, and a set of binary variables for the year-specific wealth quintile.[132] All of the control variables are lagged one period (to be in line with the base period of the dependent variable, which is a growth measure). The coefficients of interest are γ_q, which capture the effect of a 1 percentage-point change in real GDP growth on the real labour income growth of an individual in quintile q.

As discussed in Section 2.2, labour income can be affected through transitions in labour market status, hours worked, and wages. Employment transitions drive the estimates for labour income, since very small observations of labour income generate outliers in the dependent variable. A transition into a full year of unemployment is a –100 per cent change in labour income, and a transition out of a full year of unemployment is an undefined (or infinite) increase.

We find evidence that the estimates in Stone (ibid) are substantially affected by outliers. Her specification uses log-differences as the dependent variable, which are a good approximation of percentage change for only small values, and the sample does not appear to remove outliers.[133] We use percentage change of the real income and GDP measures and filter outliers in our sample selection.[134] This effectively removes observations with zero or very small real labour income in the previous period. The size of estimates and standard

130. The framework does not distinguish between the *type* of shock that drives GDP growth, which would have important distinctions for policy. For example, changes in GDP growth driven by structural change may require a different policy response to those driven by weak demand.
131. This means that each person is in the same quintile over all years.
132. Marital status includes partnered, separated, and single. Other controls are defined as in Appendix A and B.
133. The direct conversion of the log-difference measure of 5 per cent is 4.88 per cent, whereas for 100 per cent it is 69.31 per cent. Whether a log transformation is appropriate also depends on the true underlying relationship between income and its determinants.
134. Using a bounded income growth measure $\frac{200*(Y_{i,t}-Y_{i,t-1})}{Y_{i,t}+Y_{i,t-1}}$ produces a similar pattern of results.

errors are sensitive to the choice of dependent variable and sample selection, which primarily reflects the issue of capturing transitions into employment from unemployment.

We extend the framework to estimate the response of labour market outcomes to GDP growth.[135] This helps to directly measure the effects of employment transitions that complicate the income specifications. We use the same model, replacing the dependent variable with the change in weekly hours usually worked (as measured at the time of the surveys), and the percentage-point changes in the share of the financial year spent unemployed or employed. The specification with the unemployment rate is effectively a microeconometric version of Okun's Law. Although the employment response to demand can involve some lags, using contemporaneous annual measures should capture the main effects.[136]

We use data at the responding person level from HILDA over 2001 to 2020.[137] We focus on a labour-force sample of workers aged 18-64 who are not retired and spent less than six months of the current and previous financial year as NILF. We used different filtering depending on the dependent variable:

- For real labour income, we limit the sample to those with less than 1,000 per cent growth.[138]
- For hours, we limit the sample to those with a change in hours greater than -75 hours and less than 75 hours.
- For unemployment and employment, we conduct no additional filtering to the sample.

The sample for the real capital income growth response in Section 2.2 includes all individuals over the age of 18 who report capital income or loss in the previous period. We restrict the sample for real capital income growth less than 1,000 per cent and greater than -1,000 per cent, which removes about 5 per cent of observations.[139]

The size and standard errors of estimates change with different sample definitions and clustering, but the broad pattern of results is quite robust. Standard errors are clustered by state, individual, and wealth or wage quintile. Clustering on the quintile variable helps to correct standard errors for the presence of cross-sectional correlation across individuals within the quintile. This makes a large difference for the wealth distribution, increasing standard errors substantially and eliminating otherwise significant findings.

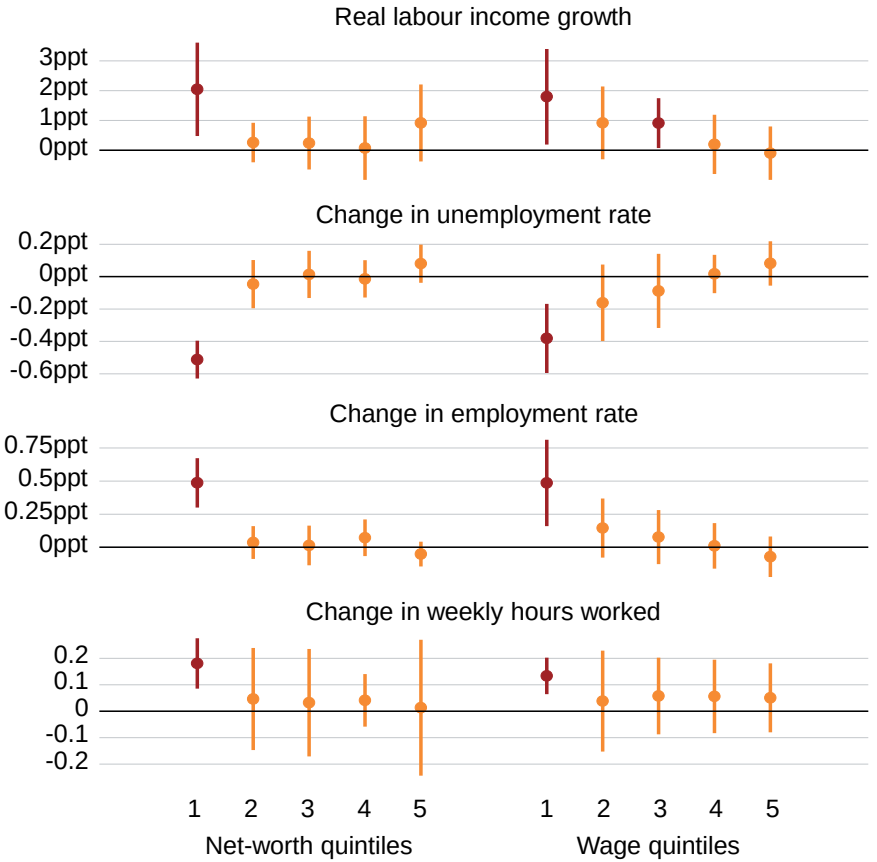
There are some limitations to this framework. It maps a national macroeconomic variable that varies only over time, not the cross-section, to individual outcomes. Time fixed effects are not used, so we cannot rule out time-varying confounders that correlate with GDP.[140] A key issue in this respect is structural change, which is not considered a purely cyclical dynamic. An extended model uses (state-specific) real Gross State Product (GSP) growth along with additional time fixed effects (Figure C.1). This model identifies the coefficients of interest through variation in GSP growth across states rather than over time,

135. It can also be used with capital income, but these results are omitted because they are less relevant to the focus of this report – for working-age households, only those with high wealth generate a substantial share of income from capital.
136. Lancaster and Tulip (2015) relate quarterly changes in unemployment to two-quarter annualised GDP growth. RBA (2014) shows simple correlations where the peak occurs with a lag of between one and three quarters.
137. The labour share of national income can be considered roughly constant over the period of the sample, and the analysis is very similar if using growth in real GDP per capita.
138. This then excludes anyone with zero labour income in the previous period, and removes the top 0.65 per cent of the sample.
139. Increasing the thresholds from 1,000 per cent to 5,000 per cent increases the estimate from 3.45 to 9.35.
140. Time fixed effects can be included by dropping one of the quintile groups (and so identifying the relative size of effects across quintiles); however, the pattern of results for real labour income growth remained very similar.

providing a measure of sensitivity to state-specific business cycles. The results are similar, although the coefficients are smaller.

Figure C.1: Low-wage and low-wealth workers earn more when their states grow

Change in labour market outcomes for a 1 percentage-point increase in Gross State Product growth



Notes: Estimates are from the state-based model described in Appendix C. The dots are point estimates and the lines are two-standard-error bands. Red dots and lines are statistically significant at the 10 per cent threshold.

Source: Grattan analysis of HILDA Release 20.0, and ABS 5206.0 and 6401.0.

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