Breaking Down Barriers

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7 | Report Series

Individual Earnings Changes and the Business Cycle: An Analysis of Australian Longitudinal Tax Data

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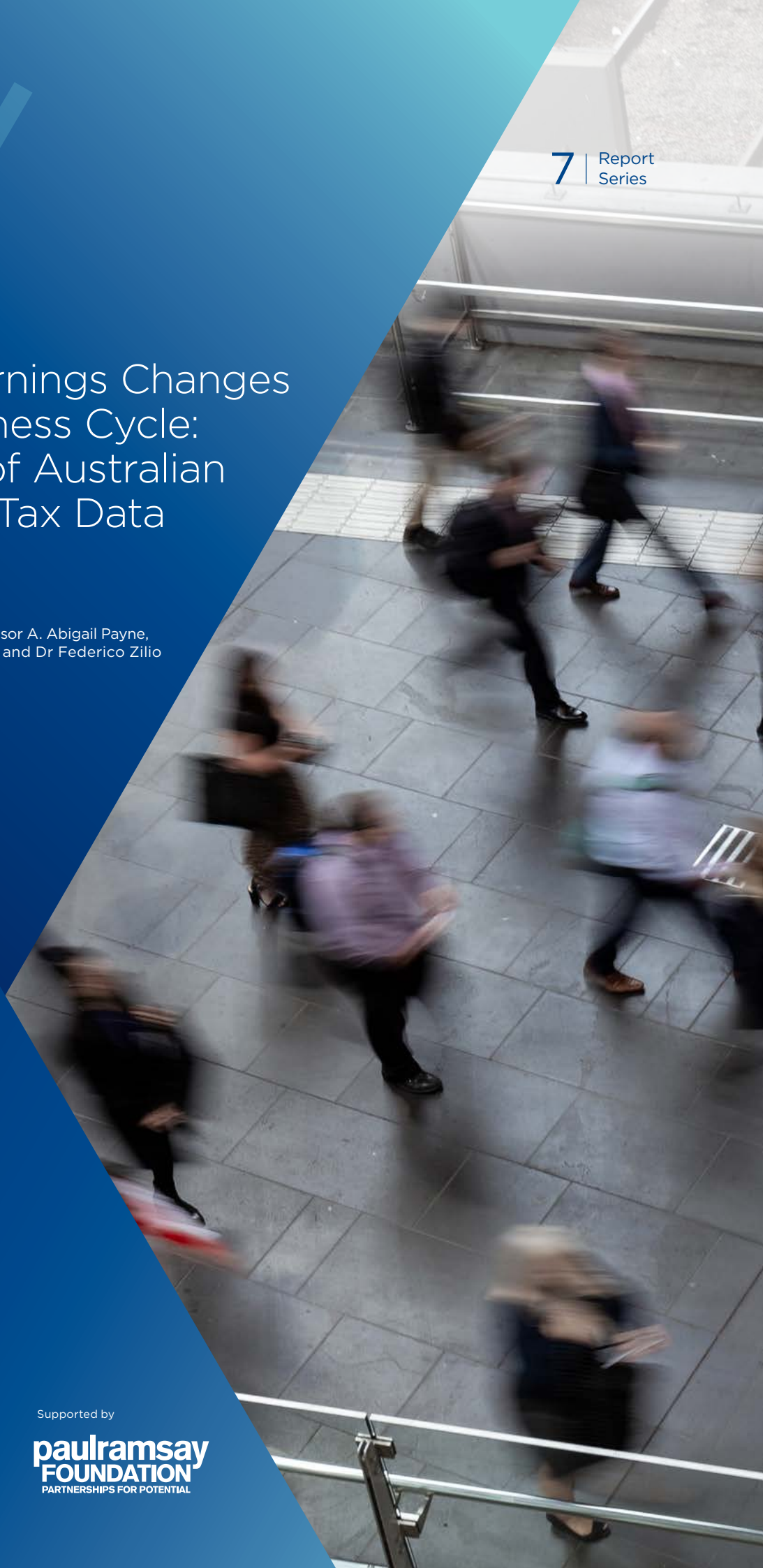

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Executive Summary

Poverty is countercyclical: it increases during recessions and declines when the economy grows. This is because when employment is high, and wages rise, there are greater opportunities for people to increase earnings and hence income. Conversely, when unemployment is high and wage growth is sluggish, poverty rates tend to increase because people with low earnings face more difficulties.

This report studies the relationship between earnings changes and business-cycle fluctuations in the Australian economy. Using longitudinal data from Australian tax records, we examine earnings changes over the macroeconomic periods that have characterised the Australian economy in the last 30 years. Our analysis studies differences in earnings changes for those at the bottom and top of the earnings distribution; for males and females; and in each of the four most populated states.

The key findings of the report are:

- Earnings changes vary with the business cycle. Earnings growth was low, and indeed negative for most workers, in the early 1990s recession and during the economic slowdown in 2001. Earnings growth was also low during the global financial crisis (GFC). Earnings growth was high in the productivity boom period of the mid-1990s, typically in the range of three to four percent, and it was also relatively high in the resources boom period from 2001 to 2008. After 2012, in the Dog Days period, earnings growth slowed but was higher than it had been in previous slowdowns.
- In percentage terms, earnings growth tends to be higher for people at the bottom of the earnings distribution than for those at the top. For example, during the resources boom, median earnings growth exceeded five percent for low earners, but it was between zero and three percent for most higher earners. This pattern reflects the fact that people at the bottom are more likely to work part-time and spend some time out of work. If they increase their labour supply even slightly in successive years, they experience high earnings growth. Significantly, earnings growth for people at the bottom of the earnings distribution is generally more adversely impacted by economic slowdowns than is the case for people with higher earnings. Conversely, periods of expansion have greater positive impacts on earnings growth for those at the lower end of the earnings distribution.
- There is a lot of dispersion in earnings changes for people at the bottom of the earnings distribution. Most people experience earnings growth, but a significant share experience falls in earnings. Indeed, at least 25 percent of low earners experience earnings declines of 50 percent or more from one year to the next.
- Findings for males and females are similar, but the percentage experiencing earnings growth is generally larger for males. Patterns of earnings growth for New South Wales, Victoria, and Queensland are relatively similar. Western Australia experienced higher earnings growth from 1990 to 2012 and lower earnings growth in more recent years.

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1. Introduction


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Poverty is countercyclical, with a tendency to rise in recessions and decline in periods of economic expansion (Blank, 2000; Gundersen and Ziliak, 2004; Bitler and Hoynes, 2015, 2016). Empirical evidence confirms that poverty rates in Australia are sensitive to the business cycle. A Productivity Commission (2018) study finds that, in the last 30 years, income poverty was at its highest level during the GFC in 2009–10 and relatively lower in periods of high growth.

The negative relationship between economic growth and the poverty rate derives from the cyclicality of labour earnings, which represent the dominant component of income for working-age individuals and households. A period of expansion is characterised by high employment levels and sustained wage growth as there are more jobs available in the labour market and employers are more willing to offer pay rises to attract and retain labour. In recessions there are fewer job opportunities, wages may drop and people may experience long periods of unemployment. Since increasing labour earnings of people in low-income households is one of the main paths to reducing poverty, it is important to document the relation between earnings changes and the business-cycle fluctuations of the economy.

Using US data, Guvenen et al. (2014) find a strong countercyclical relationship between business cycles and earnings changes: periods of economic boom reduce the probability of experiencing negative earnings changes and periods of economic decline increase the probability. Conversely, positive earnings changes are more likely in a period of expansion than in a period of contraction. Busch et al. (2022) compare the US, Sweden and Germany and show that although there are differences across countries, the contribution to earnings growth in expansions is driven by people who work more hours and are paid higher wages. They emphasise the role of the welfare system in mitigating negative earnings shocks in recessions.

A second crucial motivation for studying earnings changes over the business cycle is that the consequences of recessions may be unequally felt. Guvenen et al. (2014) show that during the Great Recession in the US, the fall in earnings for those at the bottom of the earnings distribution was 18 percent worse than that experienced by those at the top. Hoynes et al. (2012) find that the Great Recession in the US had greater negative impacts on males, ethnic minorities, young people, and workers with low education levels. In a more recent study of the consequences of the COVID-19 pandemic, Adams-Prassl et al.

(2020) use survey data for the US, the UK and Germany to show that females and workers with low education levels were the most adversely affected and that employees with fixed-term contracts were more likely to lose their jobs.

In light of the 2020 COVID-19 pandemic recession in Australia, should we expect there to be unequal patterns in the effects of the recession on lower-income workers? We can provide insights into this question by examining, over the last several decades, whether the changes in earnings during boom and bust periods and other periods of economic expansion and contraction mirror what is observed in other countries.

Using Australian longitudinal data on tax records from 1991 to 2017, this report examines the effects of economic slowdowns and expansions on earnings changes, focusing on differences between those at the bottom and those at the top of the earnings distribution. Given the years spanned by our data, we explore this relationship over the following macroeconomic periods, as characterised by Garnaut (2021): the 1990–92 recession; the productivity boom (1993–2001); the resources boom (2002–08); the GFC and recovery (2009–12); and the Dog Days (2013–17). We show that earnings growth is greater in periods of economic expansion than in periods of contraction, and that those at the bottom of the earnings distribution typically experience higher earnings growth, reflecting the low earnings base from which they start. We then conduct the analysis separately by gender and find that earnings of males grow at a higher rate than earnings of females in both booms and recessions. We also compare earnings fluctuations across the four most populated states, showing a large variation in growth rate across states and economic periods.

This report complements studies in the *Breaking Down Barriers* series. Vera-Toscano and Wilkins (2022) examine poverty persistence and find that it is more prevalent among females, single-parent families, the elderly, and people living in more disadvantaged regions. Interestingly, they find that transitions into poverty increase by over 50 percent when household earnings decline. Ananyev et al. (2020) study the movement into and out of poverty using Australian Census data for 2006, 2011 and 2016. They document the importance of age, employment status, place of birth, family composition, and educational attainment in being identified as living in poverty as well as in moving in and out of cycles of poverty.

Ananyev et al. (2023) study the prevalence of negative labour earnings shocks and recoveries from shocks. They find that females, those at the bottom of the earnings distribution, younger people, females with a newborn child, low-educated people, and those with a health condition are more likely to experience a negative and more persistent shock. Ananyev et al. (2020) analyse longitudinal Census data and find that poverty is entrenched for a considerable proportion of Australians. They show that living in disadvantaged communities increases the probability of poverty persistence and unemployment, while greater educational attainment improves prospects for transitioning out of poverty.

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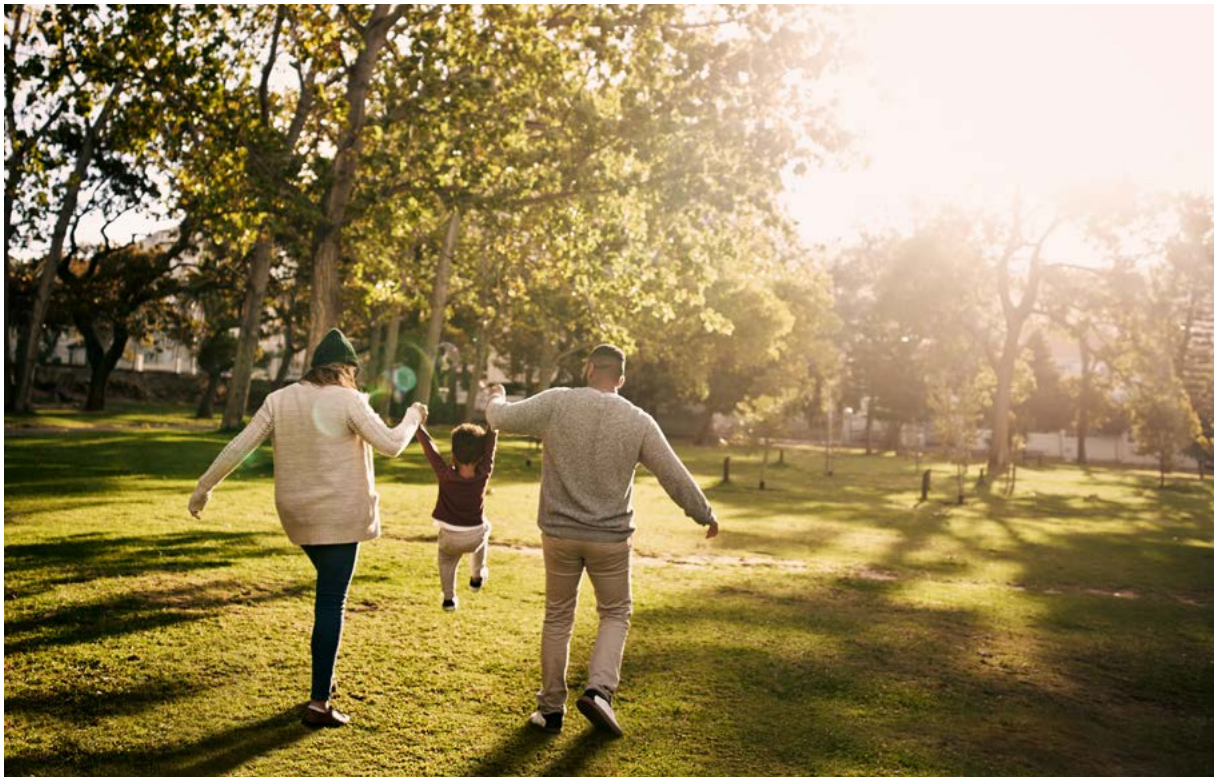
2. Data



We use the Australian Taxation Office (ATO) Longitudinal Information Files (ALife), a longitudinal dataset that contains a 10 percent representative sample of Australian tax records for the financial years (FYs) 1990–91 to 2016–17. One important feature of ALife is its longitudinal structure; it contains tax records for the same individuals over many years. This is paramount for our analysis, because we need to observe earnings over time to calculate earnings changes. The large ALife sample allows us to investigate earnings changes for those at the bottom and those at the top of the earnings distribution. Although hours worked are not reported, ALife contains demographics that allow us to conduct our analysis separately by sex and geographic location.

This report focuses on Australian residents aged 25 to 54.[1] This choice is motivated by the fact that this subpopulation has a stronger attachment to the labour market. We exclude individuals aged under 25 as some of them are still in education, and individuals aged over 54 as retirement begins to be a significant confounding driver of earnings changes as people enter their late 50s. After restricting it to individuals aged 25 to 54, our sample contains 1,769,008 individuals.

As explained in more detail below, we calculate an individual's earnings change for a given year based on the change from earnings received in the preceding two years. Thus, earnings data must be reported for three consecutive years for an individual's earnings change to be calculated. Moreover, we include a requirement that, in each of the preceding two years, reported earnings are at least 25 percent of the annual earnings of a full-year full-time worker paid the contemporary adult federal minimum wage (which translates to approximately $8,900 in 2017).[2] After excluding individuals who never satisfy these requirements over the sample period, our final sample comprises 1,413,435 individuals, of whom 752,426 are male and 661,009 are female.[3]

1 The age restriction is based on age in the year the earnings change is observed, that is, earnings prior to a person turning 25 are used to calculate earnings changes for those aged 25 and 26. Specifically, earnings at ages 23 and 24 are used to calculate the earnings change for those aged 25, and earnings at age 24 (and 25) are used to calculate the earnings change of those aged 26. For more details see Ananyev et al. (2023).

2 The minimum earnings threshold for the two preceding years is imposed to ensure that individuals have a significant attachment to the labour market. Persons who earn less than one quarter of the annual full-time minimum wage for successive years are likely reliant on welfare benefits or other family members and, although they are a group that deserves attention, they are outside the scope of this study.

3 See Ananyev et al. (2023) for further details on data and sample selection.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3. Macroeconomic conditions in Australia between 1990 and 2020

Garnaut (2021), reviewing the recent economic history of Australia, characterises the approximate three decades to 2020 as comprising four distinct macroeconomic periods:

1. the productivity boom (spanning 1993 to 2001, a period that followed the sharp recession in 1990–92 and ended with an economic contraction in 2001–02);
2. the resources boom (spanning 2002 to 2007);
3. the GFC and recovery (spanning 2008 to 2011); and
4. a period of low growth or the Dog Days (2013 until the onset of the COVID-19 pandemic).

We adopt this characterisation of the evolution of macroeconomic conditions in our investigation of their links with individuals' earnings changes. To help us describe the four periods we plot annual growth rates of Gross Domestic Product (GDP), GDP per capita and Real Net National Disposable Income (RNNDI) per capita in Figure 3.1 and the unemployment rate in Figure 3.2.

Macroeconomic measures examined in this report

GDP, estimates of which are produced by the Australian Bureau of Statistics (ABS) quarterly as part of its national accounts, is defined as the total market value of goods and services produced in Australia after deducting the cost of goods and services used up (intermediate consumption) in the process of production, but before deducting allowances for the consumption of fixed capital (depreciation). **Real GDP** removes the effects of inflation (the rise in the general price level).

RNNDI is a measure of the income accruing to Australian residents and is a better measure of the economic wellbeing of Australian residents than (real) GDP. Compared with GDP, it additionally takes account of:

- the impact of changes in prices of our exports relative to changes in prices of our imports (the terms of trade effect);
- the real impact of income flows between Australia and the rest of the world; and
- the consumption of fixed capital, which is the depreciation of machinery, buildings and other produced capital.

Per capita measures of real GDP and RNNDI remove the effects of population change by dividing the Australian aggregates for each measure by the resident population. See ABS (2021) for further details on the Australian system of national accounts.

The **unemployment rate** is defined as the proportion of the labour force that is unemployed. To be classified as unemployed, an individual must be not employed, actively searching for employment, and available to work. The labour force comprises the sum of the employed and unemployed.

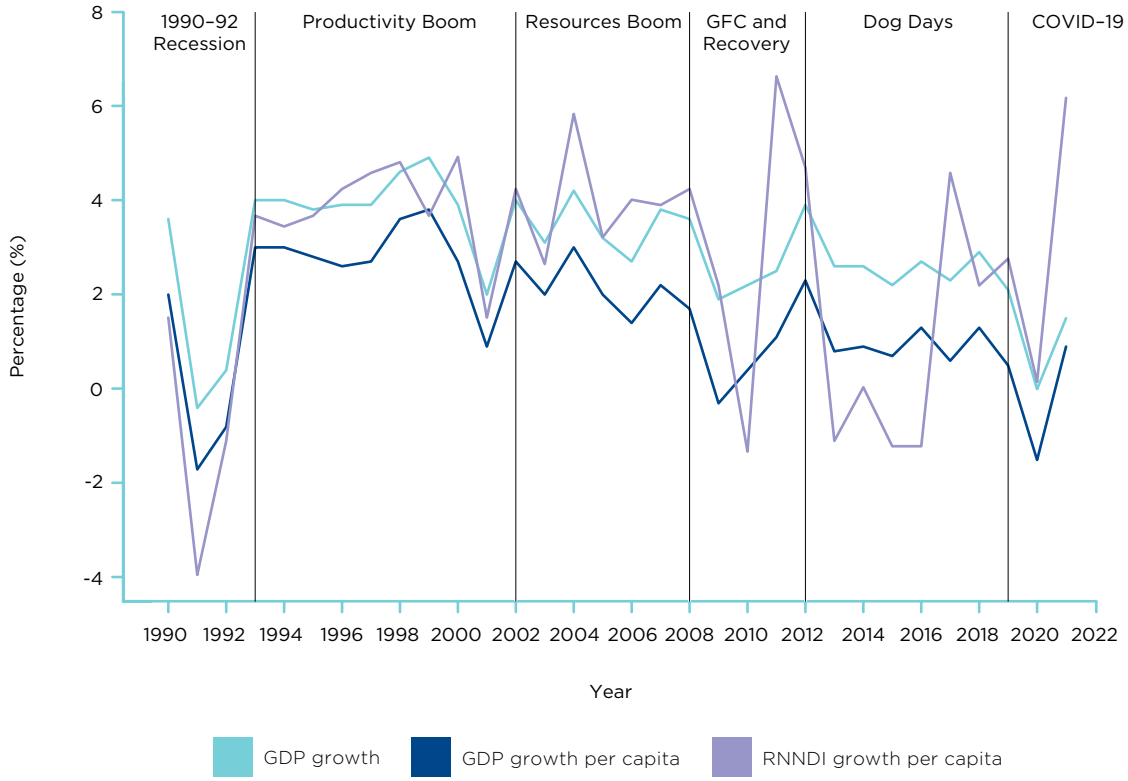
At the beginning of the 1990s the Australian economy was hit by a recession. In 1991 real GDP fell by 0.4 percent and real GDP per capita decreased by 1.7 percent. The unemployment rate grew from 6.2 percent in 1990 to 10 percent in 1991 and peaked at 11.2 percent in December 1992. Notably, at the peak of the recession, the unemployment rate for females (10.4 percent) was lower than the rate for males (11.8 percent).

Following the recession, Australia experienced a strong increase in productivity that led to seven years of sustained growth—the productivity boom period. From 1993 to 2000, GDP and GDP per capita respectively grew at an average annual rate of 4.2 percent and 3.1 percent, while the unemployment rate decreased year by year, reaching a low of 6 percent in September 2001. The productivity boom ended in 2001 when GDP growth slowed to 2 percent per annum and the unemployment rate rose to 7.2 percent.

After 2001, Australia experienced a second period of expansion from 2002 to 2011. This is the period of the resources boom as the growth in the economy was largely sustained by the demand from China for Australian resources, which drove prices of materials such as iron ore, coal and metallic minerals to record levels. From 2001 the unemployment rate continued to fall, reaching as low as four percent immediately prior to the arrival of the GFC in 2008.

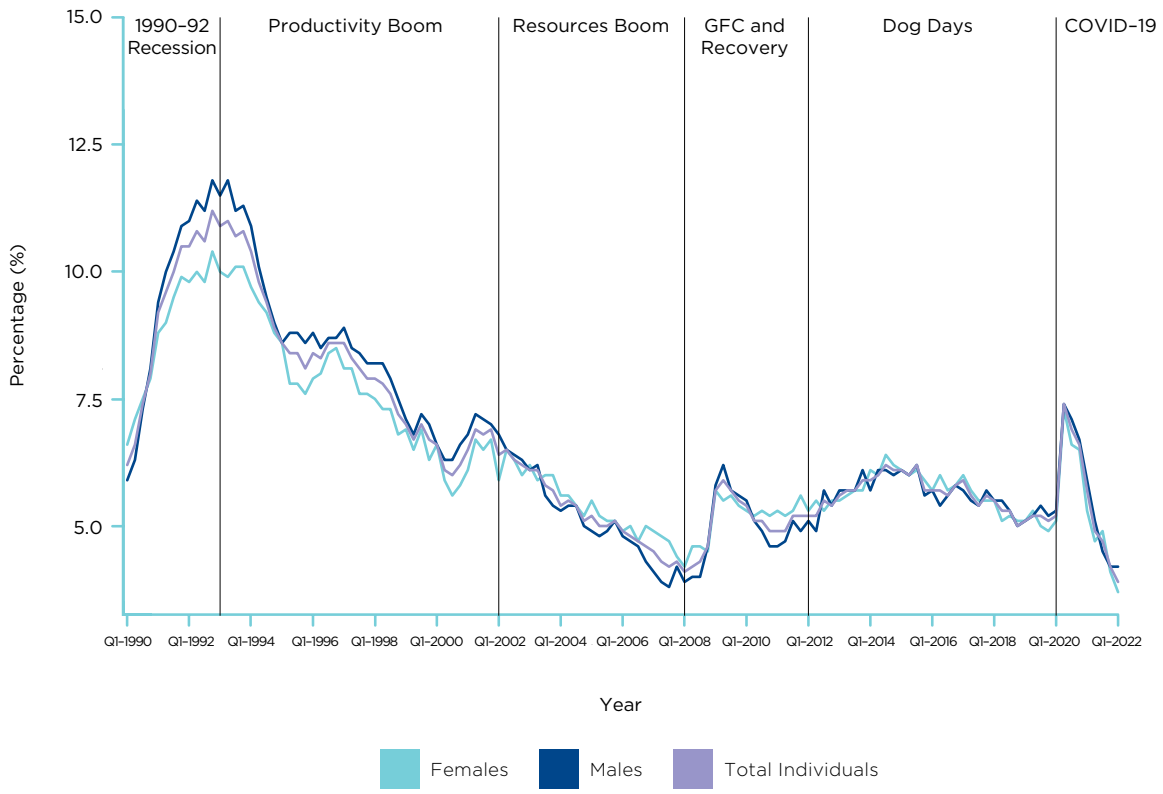
The GFC in 2008–09 had only a modest impact on the Australian economy, largely because China's demand for resources remained strong. In 2009, Australian GDP grew by 1.9 percent while GDP per capita fell by 0.2 percent and the unemployment rate rose to six percent. The resources boom continued until 2012, when the Dog Days period started. The Dog Days are the years from 2013 to 2020, when GDP growth was mainly driven by population growth, and productivity growth rates were low. As shown in Figure 3.1, although GDP continued to increase at a pace faster than two percent per annum, GDP per capita grew on average by only 0.9 percent per annum and the unemployment rate remained stable at around six percent.

Figure 3.1. GDP growth, GDP growth per capita, RNNDI growth per capita 1990–2021



Notes: GDP growth, GDP growth per capita, RNNDI growth per capita data are taken from the Australian National Accounts (ABS, 2022).

Figure 3.2. Unemployment rate of the Australian population aged 25–54, 1990–2020



Notes: Unemployment rate data are taken from the ABS Labour Force (ABS, 2023) and refer to the Australian population aged 25 to 54. Q1 is the March quarter, Q2 is the June quarter, Q3 is the September quarter and Q4 is the December quarter.

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4. Macroeconomic periods and earnings changes: Males

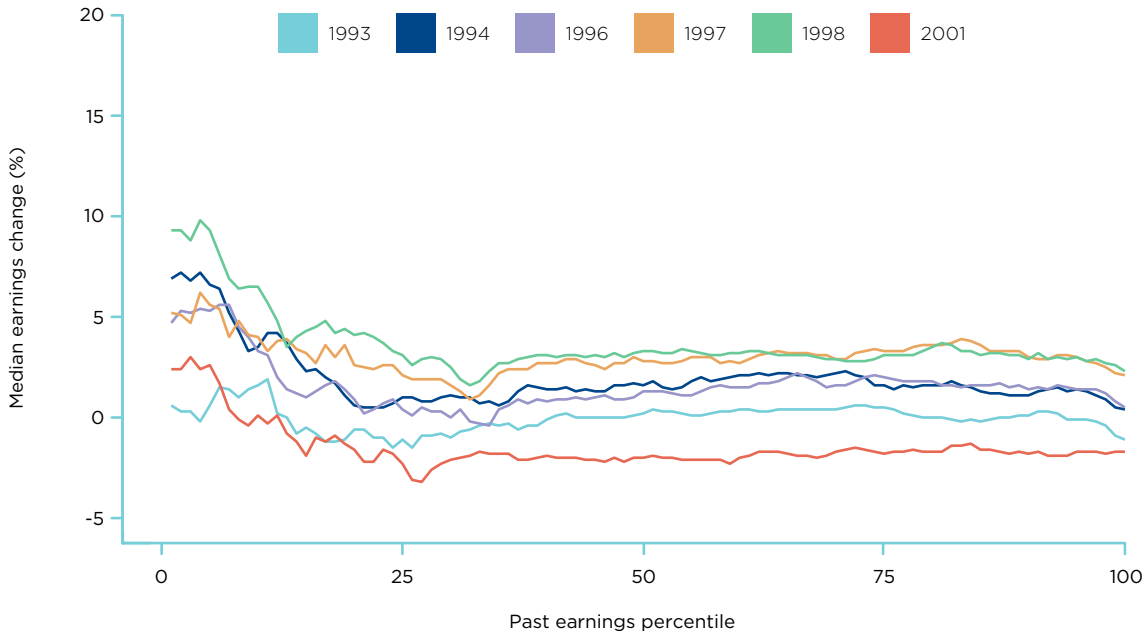
To investigate earnings changes over the macroeconomic periods described above, we compare earnings in each year with earnings in each of the two previous years. Specifically, we identify which of the previous two years the individual had the lowest earnings, and then compute the percentage change in earnings between that year and the current year.[4] In the interest of clarity, the percentage change in earnings in year t ($\%\Delta e_t$) is calculated using the following equation:

$$\%\Delta e_t = \left(\frac{e_t - min\{e_{t-1}, e_{t-2}\}}{min\{e_{t-1}, e_{t-2}\}} \right) \times 100.$$

A positive percentage (i.e., $\%\Delta e_t > 0$) indicates earnings growth, whereas a negative percentage indicates a decline. We undertake (and report) our analysis separately for males and females.

Beginning with our analysis of males, Figures 4.1 to 4.4[5] plot the median percentage change in earnings (the median of $\%\Delta e_t$) by percentile of the distribution of minimum earnings in the previous two years (i.e., by the percentile in the earnings distribution of $min\{e_{t-1}, e_{t-2}\}$). The number 1 on the x-axis represents the first percentile—those individuals with the lowest past earnings—while the number 100 marks the 100th percentile, those individuals with the highest past earnings.

Figure 4.1. Median earnings change, by past earnings percentile. Productivity boom period (1993–1999) and economic slowdown (2000–2001)—Males

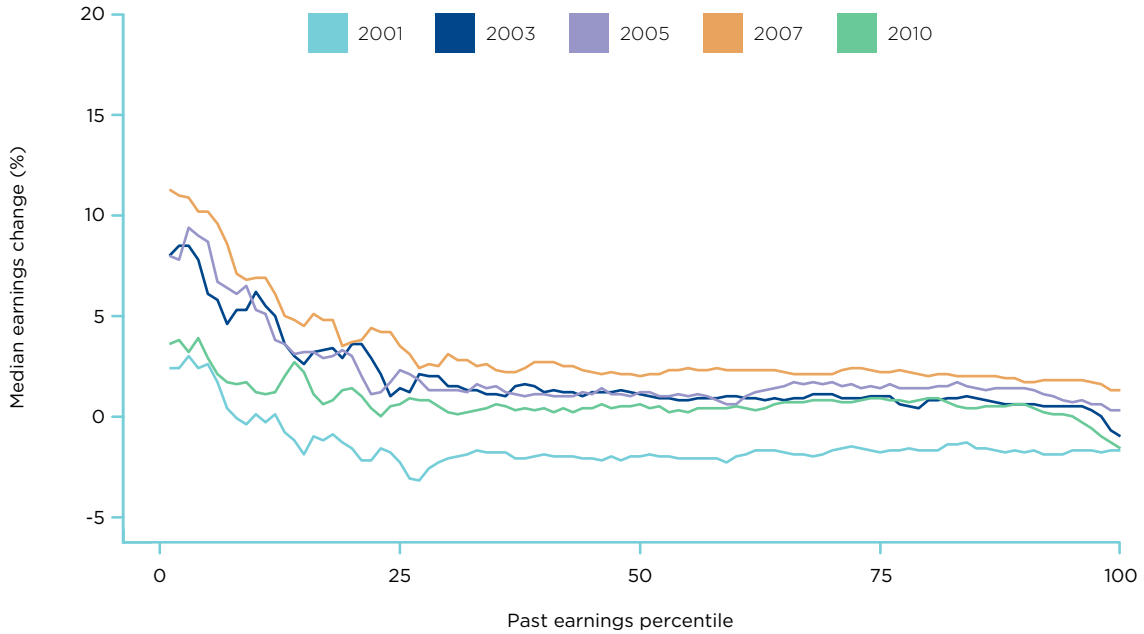


Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings. The years listed in the legend refer to the tax year ending 30 June of the indicated year.

4 All dollars have been converted into real dollars, using 2017 as the base year.

5 To make the visualisation of the graphs clearer, we show some selected years and plot those with the strongest and weakest earnings growth performance. Year 2001 (the 2000-01 tax year) is shown in both Figures 4.1 and 4.2 as it is the year that represents a break between the productivity boom and the resources boom and constitutes a good benchmark for prior and successive years. Year 2010 (2009-10 tax year) is shown in Figures 4.2 and 4.3 as it represents the break year between the resources boom and the Dog Days period.

Figure 4.2. Median earnings change, by past earnings percentile. Economic slowdown (2000–2001), resources boom (2002–2007) and GFC (2008–2010)—Males

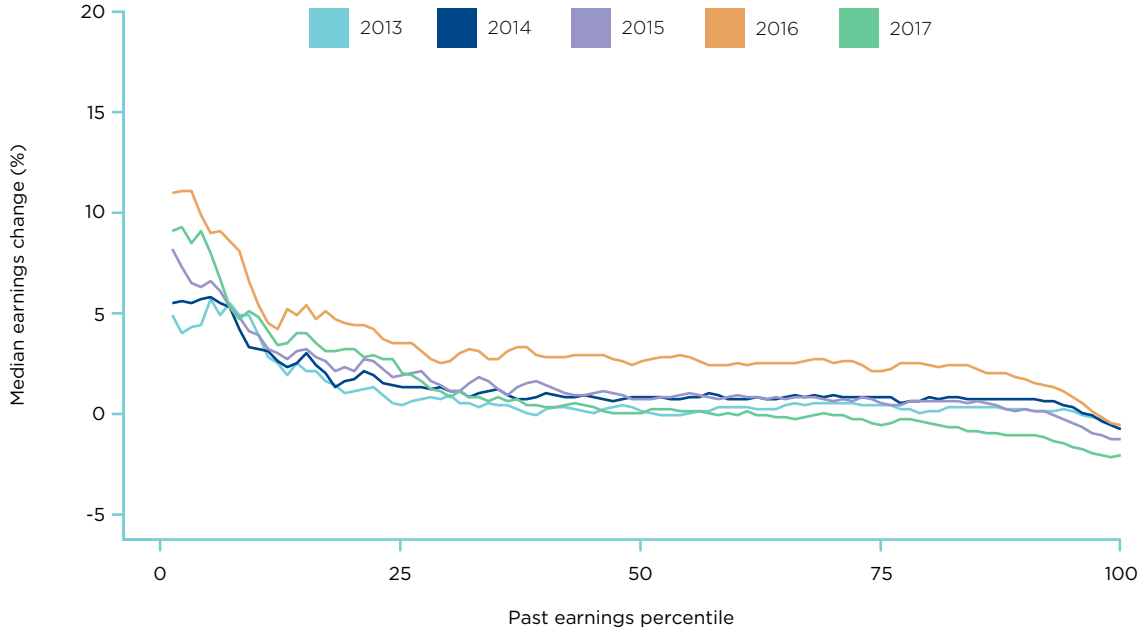


Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings. The years listed in the legend refer to the tax year ending 30 June of the indicated year.

Figure 4.3. Median earnings change, by past earnings percentile. GFC (2008–2010) and recovery (2011–2012)—Males

Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings. The years listed in the legend refer to the tax year ending 30 June of the indicated year.

Figure 4.4. Median earnings change, by past earnings percentile. Dog Days period (2013–2017) —Males



Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings. The years listed in the legend refer to the tax year ending 30 June of the indicated year.

Figures 4.1 to 4.4 depict the median earnings changes for males across four macroeconomic periods. In Figure 4.1, we examine the period from 1993 to 2001. This period captures the end of the 1990–92 recession, the period of the productivity boom and the start of the 2001 slowdown. Median earnings changes tend to be positive in most years, except for 1993 and especially 2001, both of which were periods of economic slowdown.

Those with the lowest incomes have higher median percentage growth in earnings. In 1997 and 1998, two years of strong economic growth fuelled by the productivity boom, the bottom 30 percent of the past earnings distribution had relatively high median earnings growth, with those in the bottom five percent of past earnings in 1998 having especially strong growth of nearly 10 percent. Those in the bottom 20 percent of past earnings also had relatively strong earnings growth of approximately seven percent in 1994, while those in the bottom 10 percent had median growth of approximately five percent in 1996.

The top 65 percent by past earnings tend to have lower earnings growth than those with lower earnings, with all having relatively similar median earnings growth over the 1993 to 2001 period. In the years of economic growth, the median earnings change ranged from between one and four percent. In 1993, median earnings growth was approximately zero for all percentiles in the top 65 percent, while in 2001, median earnings growth was particularly weak, with all percentiles experiencing earnings declines.

In Figure 4.2 we examine the period from 2001 to 2010: from the end of the 2001 recession to the period of the GFC, with the resources boom falling in between. Similar patterns to those observed for the period 1992 to 2001 are evident. Individuals at the lower end of the past earnings distribution have higher median percentage earnings changes, but there is also more variation across years, with economic downturns associated with greater reduction in the earnings increase than is evident for those with higher past earnings.

In Figure 4.3, we cover the period from 2008 to 2013: from the start of the GFC to the beginning of the Dog Days period. During the GFC and the first year of the Dog Days period, individuals with the lowest levels of past earnings experienced low earnings growth compared with other years. In the years that capture the recovery from the GFC, 2011 and 2012, this group of individuals experienced much higher rates of earnings growth. Like the other figures, those at the top end of the distribution are observed experiencing more stable, but typically lower, earnings growth.

Figure 4.4 examines the Dog Days period up to 2017. Despite there being relatively low economic growth during this period, for most of the years, those at the lowest end of the past earnings distribution experienced reasonably high earnings growth, in line with the resources and productivity boom periods. For those at the upper end of the past earnings distribution, by contrast, median earnings fell in each year.

The important message to be gleaned from Figures 4.1 to 4.4 is that, not unexpectedly, earnings grow more in years of expansion than in years of recession. We observe higher earnings growth for individuals with low past earnings, suggesting an increase in job opportunities during expansion years. High earnings growth at the bottom of the distribution, however, is not too surprising. Individuals at the first percentile of the past earnings distribution earned only $8,915 in 2017. Earnings this low suggest these individuals are either working part-time or working full-time for a short period during the year (such as might be the case for someone in seasonal employment). If one is earning a low wage and the number of hours worked or the number of days worked increases just slightly, we would expect to observe high earnings growth in percentage terms.

Our findings of low earnings growth in recessions and high growth in expansion periods may not apply to all regions of Australia. To consider this possibility, in Figures 4.5 to 4.10 we depict median percentage earnings changes by location in the past earnings distribution in selected years for each of the four most populous Australian states.[6]

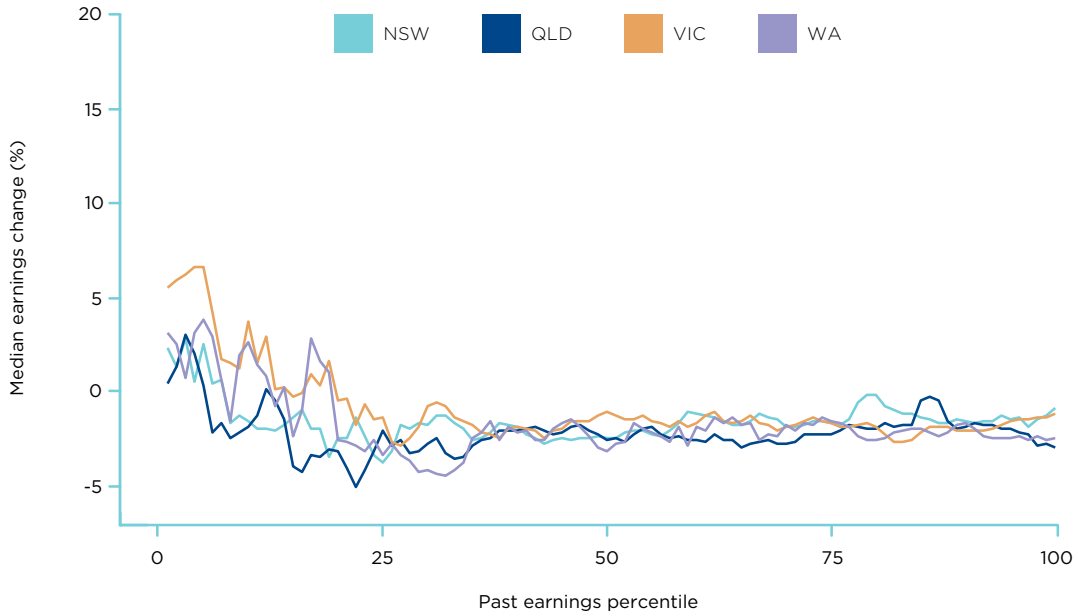
6 Estimates of earnings changes by percentile of past earnings tend to be 'noisier' (more volatile) for the smaller jurisdictions and are therefore not presented.

For most of the years, the patterns of earnings changes are very similar for New South Wales, Victoria, and Queensland. However, for all but two periods (2001 and 2010), the median earnings change for males at the bottom part of the earnings distribution is distinctly different for residents of Western Australia. There are more positive changes after the 1990–92 recession, during the resources boom and after the GFC. During the Dog Days period, however, earnings growth for those residing in Western Australia is lower than in the other states across all parts of the earnings distribution. It is also worth noting that, during the resources boom, we also observe that the median earnings growth for those in Queensland was higher than observed in New South Wales and Victoria across most of the past earnings distribution. For New South Wales and Victoria, the highest percentage earnings growth rates are observed for males in the lower third of the past earnings distribution.

Figure 4.5. Median earnings change by past earnings percentile—Males living in the most populated states, 1993

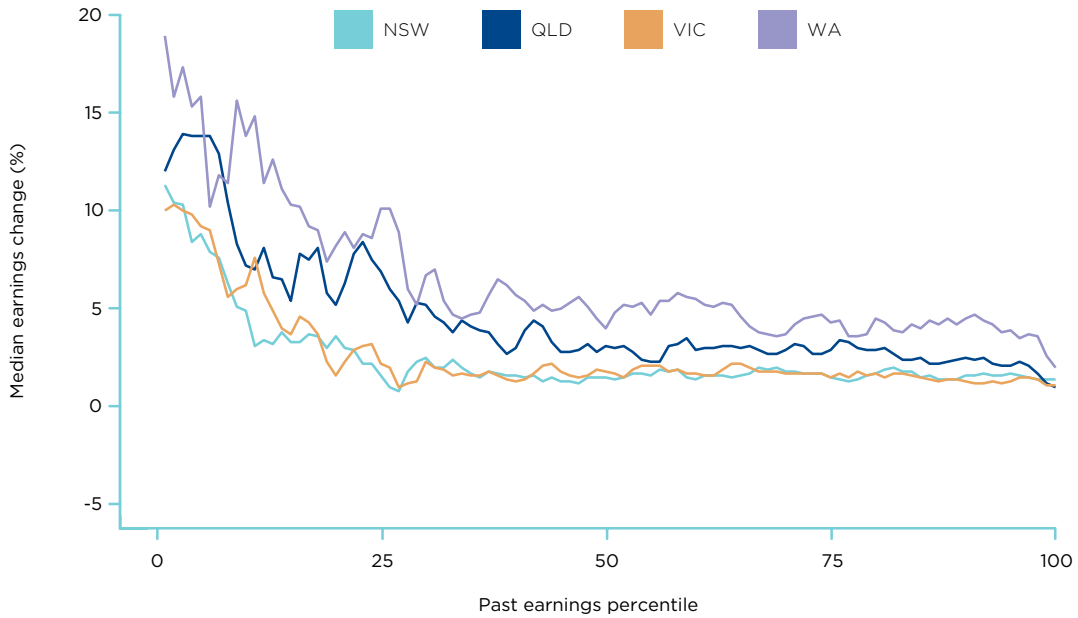
Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 4.6. Median earnings change, by past earnings percentile—Males living in the most populated states, 2001



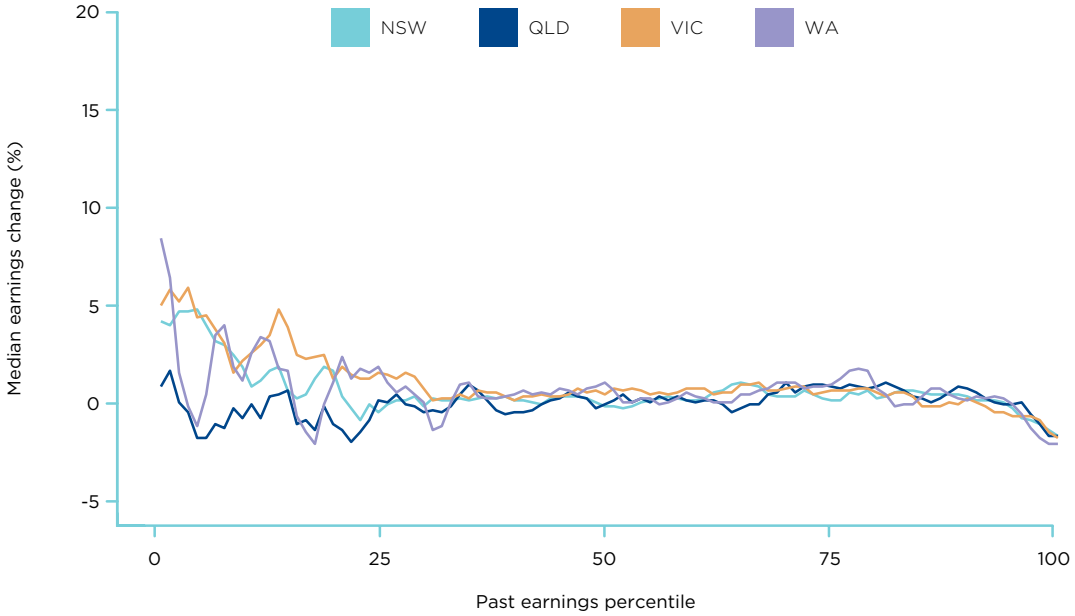
Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 4.7. Median earnings change, by past earnings percentile—Males living in the most populated states, 2007



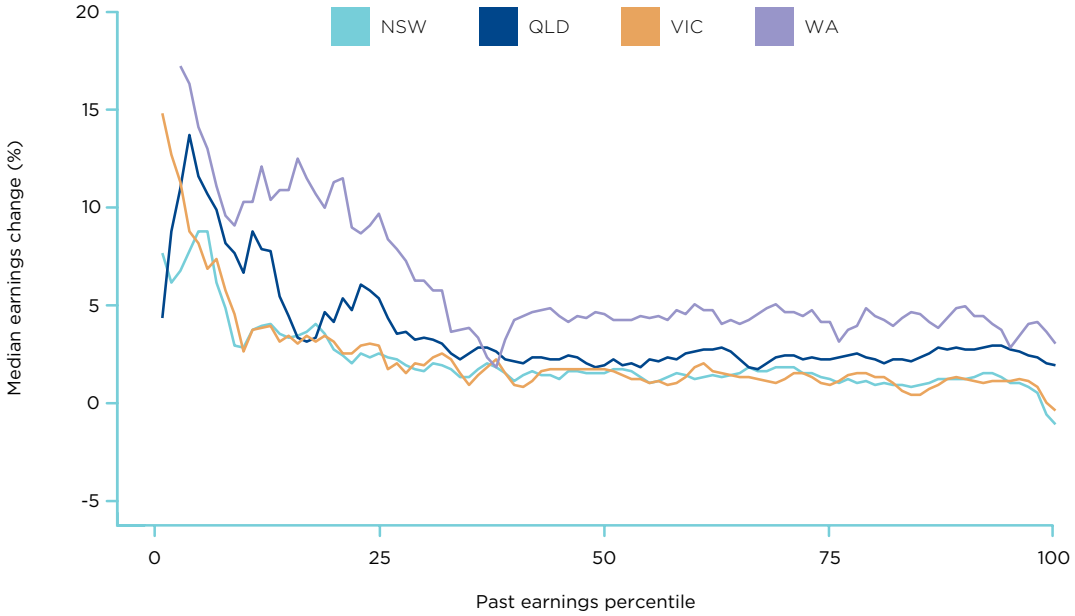
Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 4.8. Median earnings change, by past earnings percentile—Males living in the most populated states, 2010



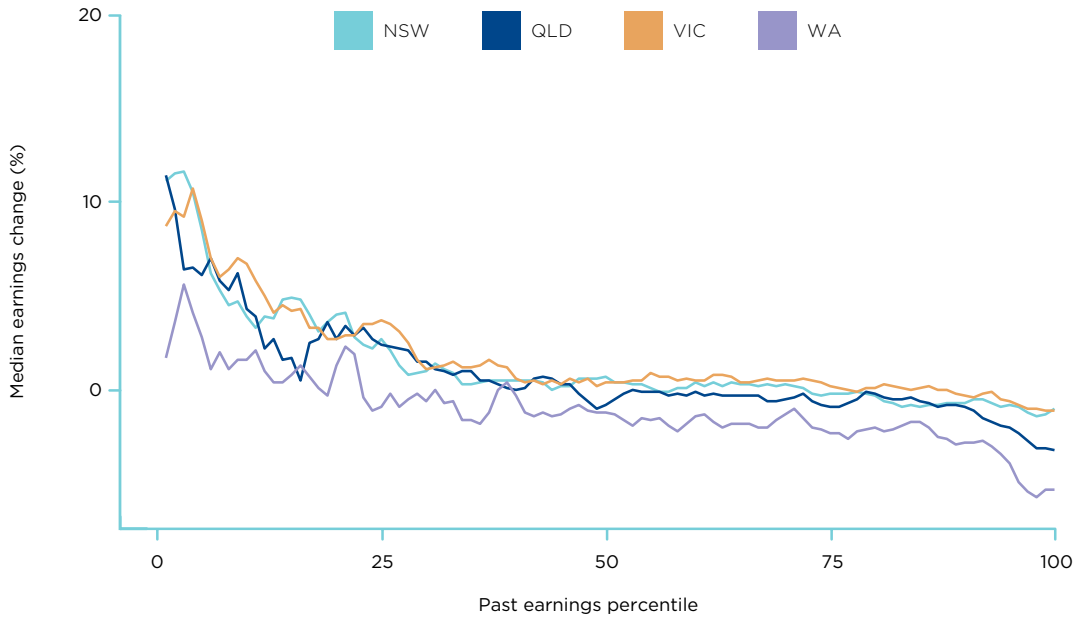
Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 4.9. Median earnings change, by past earnings percentile—Males living in the most populated states, 2012



Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 4.10. Median earnings change, by past earnings percentile—Males living in the most populated states, 2017

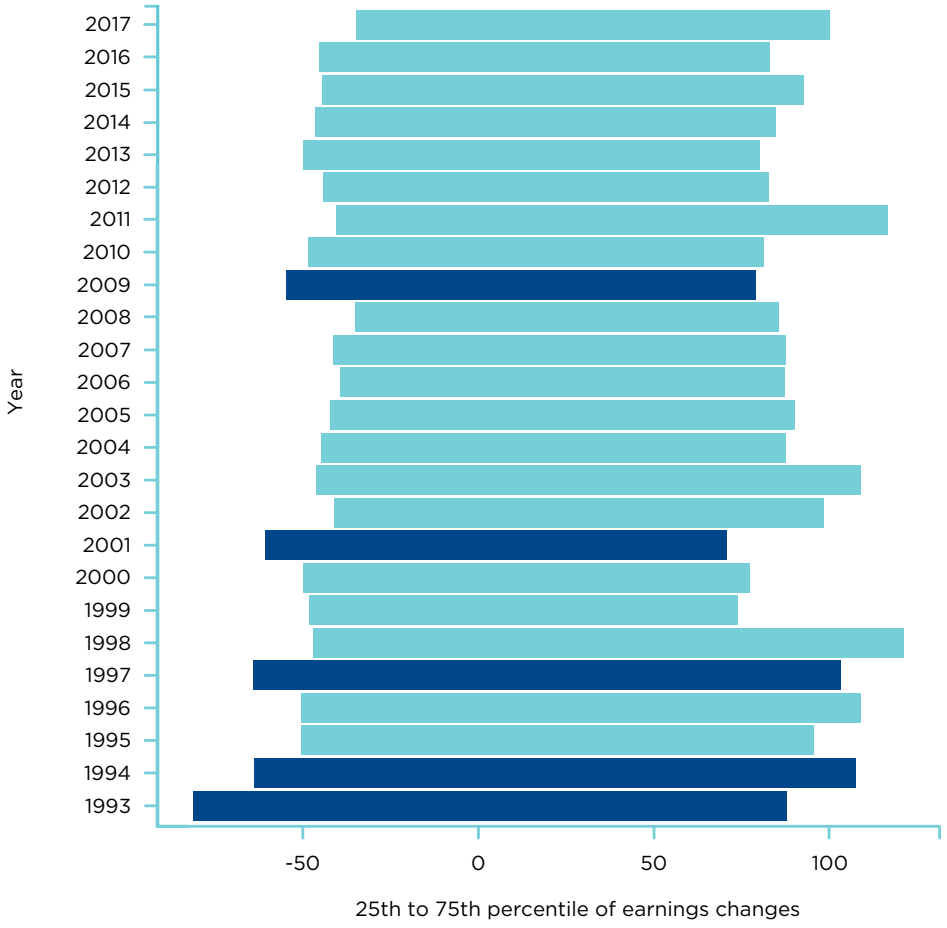


Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

The above figures depict the median earnings growth for each percentile. To illustrate variation in the changes at the bottom of the past earnings distribution, in Figure 4.11 we depict the interquartile range (the difference between the 75th percentile and the 25th percentile) of earnings growth in each year for males in the bottom five percent of the past earnings distribution.

This figure illustrates that the majority of those who are at the bottom of the past earnings distribution experience earnings growth. A substantial share, however, experiences earnings decline. The bars that are highlighted in dark blue illustrate major shifts in the interquartile range of earnings changes, which results in less growth than in other years. These years coincide with the major economic downturns. Nonetheless, even in expansion years, a considerable proportion of individuals experience a fall in earnings.

Figure 4.11. Earnings change variation, by year—Males in the bottom 5 percent of the past earnings distribution

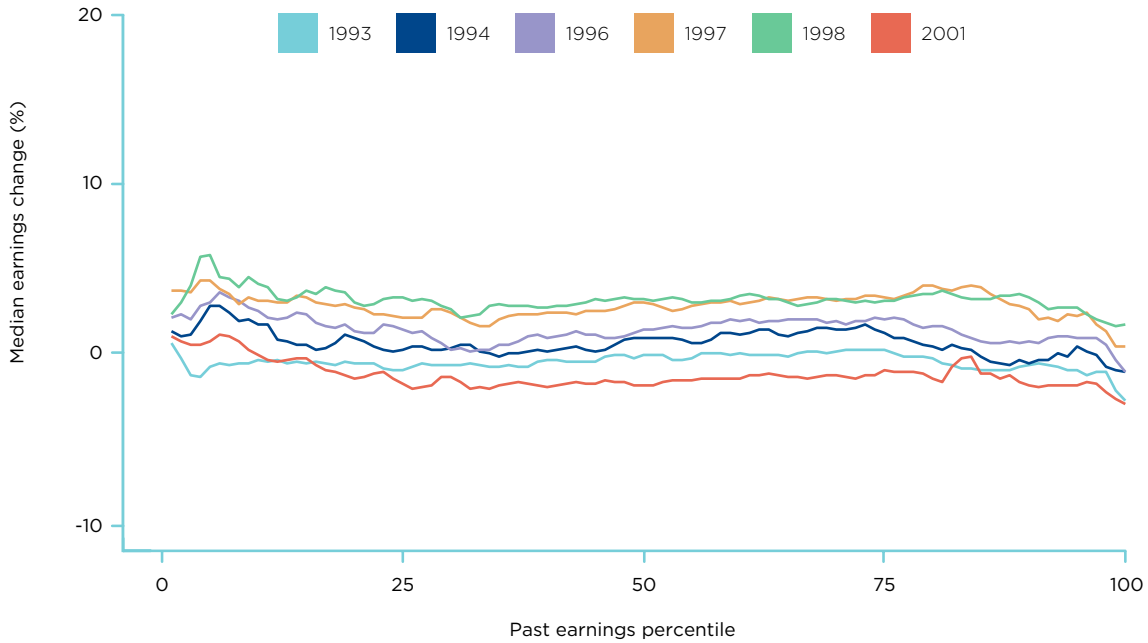


Notes: This figure shows the dispersion in earnings changes for males at the bottom of the past earnings distribution (1st to 5th percentile). Past earnings are calculated as the minimum earnings of the previous two years. Earnings changes are calculated as the percentage change between earnings in the current year and past earnings. The right extreme of the interquartile range depicts the 75th percentile of the distribution of earnings changes, and the left extreme the 25th percentile. Dark blue bars highlight the five years with the lowest 25th percentile of earnings changes.

Breaking Down Barriers

5. Macroeconomic periods and earnings changes: Females

Figure 5.1. Median earnings change, by past earnings percentile. Productivity boom period (1993–1999) and economic slowdown (2000–2001)—Females

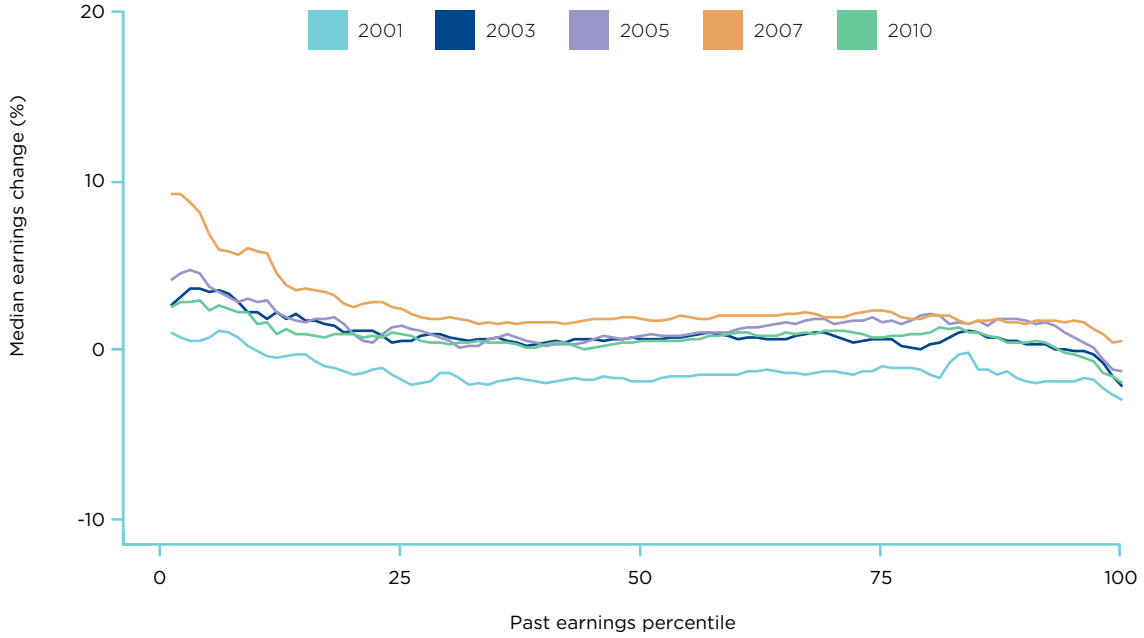


Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings. The years listed in the legend refer to the tax year ending 30 June of the indicated year.

Patterns of earnings shocks for females are presented in Figures 5.1 to 5.4, which provide analogous information to that presented for males in Figures 4.1 to 4.4. Some important differences in patterns are evident. In contrast to low-earning males, who benefited from the productivity boom with higher earnings growth rates between 1992 and 2001, Figure 5.1 shows that the median earnings growth of low-earning females was quite modest. Indeed, differences in growth rates by past earnings are relatively small for females. Differences in earnings growth rates across years are also more muted for females than for males.

Moving next to Figure 5.2, the period covering 2000 to 2010 (the end of the economic downturn of 2000, the resources boom and the GFC), the positive earnings growth for the median female remains more muted than the changes observed for males during this same period. This also means, however, that there is almost no difference in median earnings growth for economic downturns relative to periods of stronger economic growth. Figures 5.3 and 5.4 cover the periods of the GFC and the Dog Days, respectively. Again, earnings growth is more muted for females than for males during these periods.

Figure 5.2. Median earnings change, by past earnings percentile. Economic slowdown (2000–2001), resources boom (2002–2007) and GFC (2008–2010)—Females

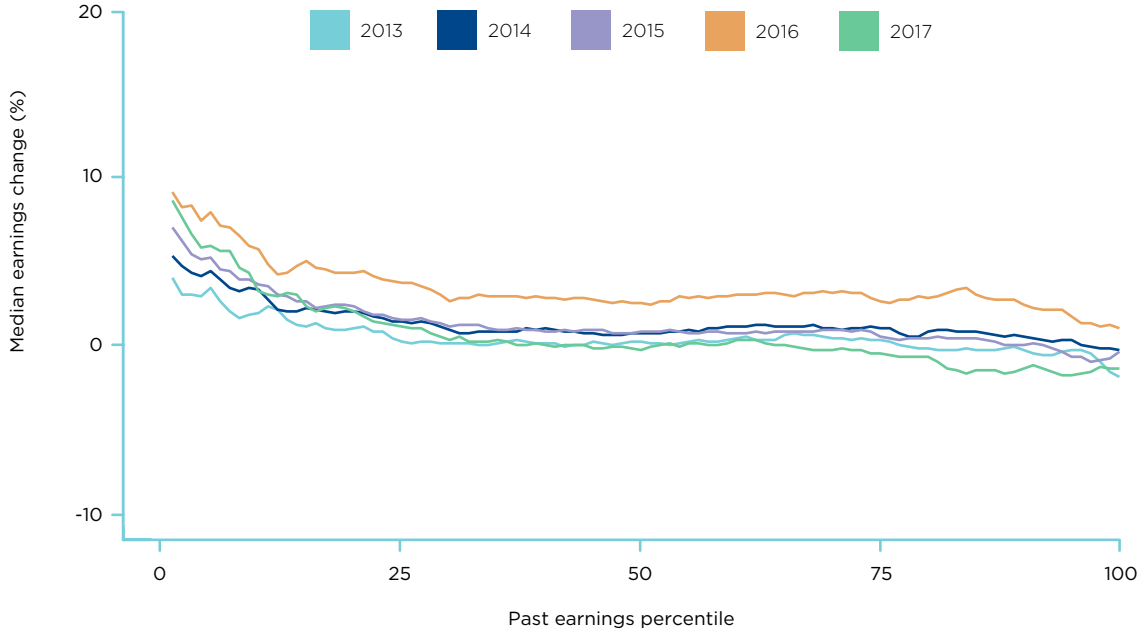


Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings. The years listed in the legend refer to the tax year ending 30 June of the indicated year.

Figure 5.3. Median earnings change, by past earnings percentile. GFC (2008–2010) and recovery (2011–2012)—Females

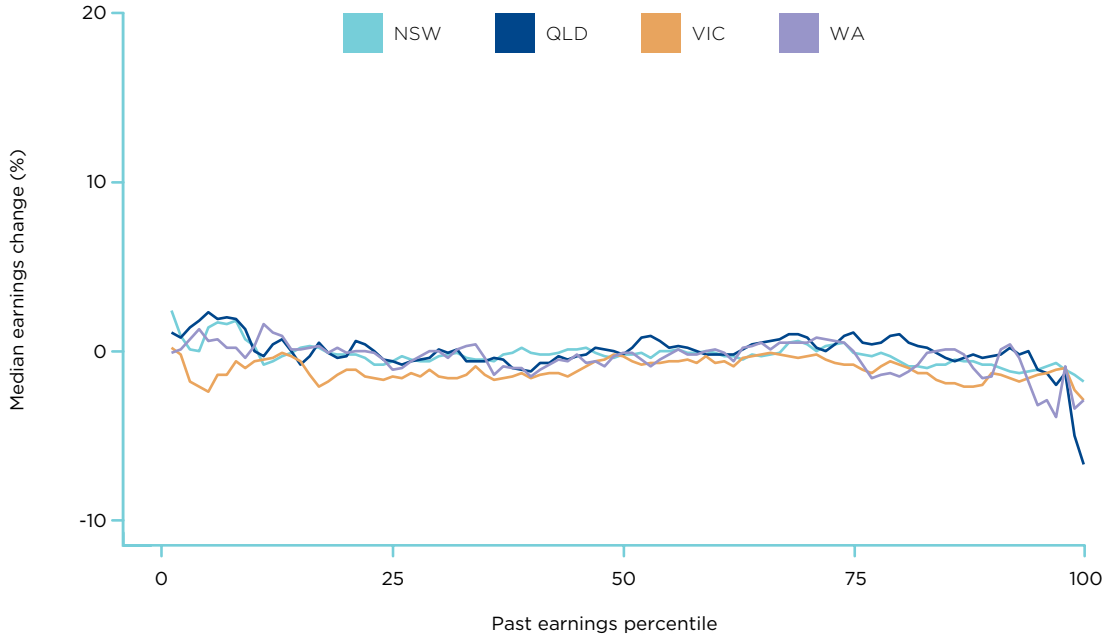
Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings. The years listed in the legend refer to the tax year ending 30 June of the indicated year.

Figure 5.4. Median earnings change, by past earnings percentile. Dog Days period (2013–2017) —Females



Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings. The years listed in the legend refer to the tax year ending 30 June of the indicated year.

Figure 5.5. Median earnings change by past earnings percentile—Females living in the most populated states, 1993



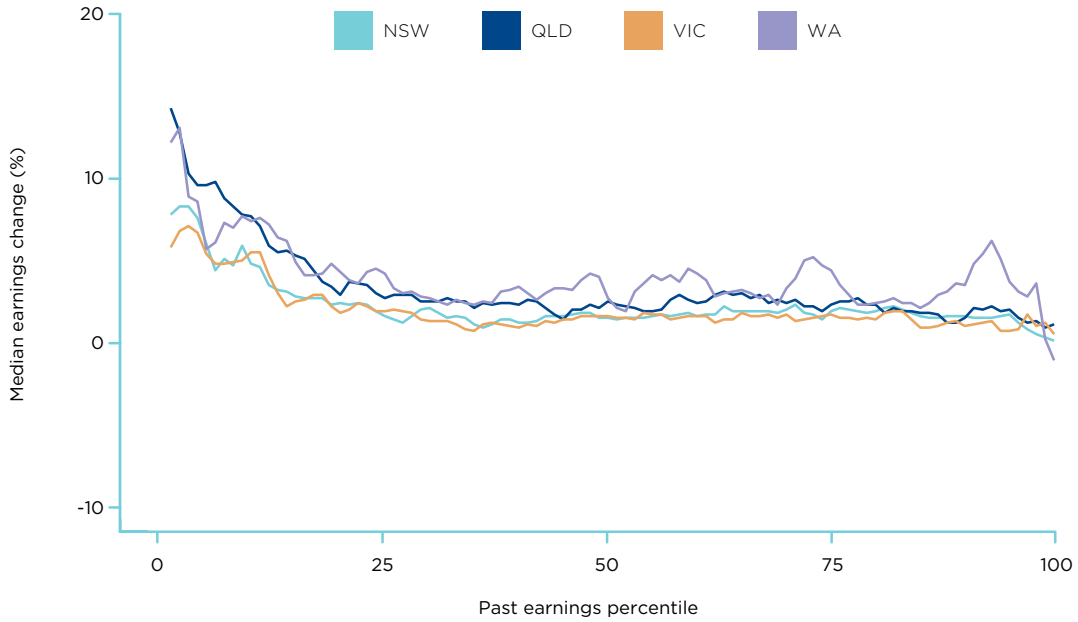
Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figures 5.5 to 5.10 depict earnings changes by percentile of past earnings for the four largest states for six different periods. Unlike the equivalent figures for males, for females there is relatively little difference across the four states in all of the periods.

Figure 5.6. Median earnings change, by past earnings percentile—Females living in the most populated states, 2001

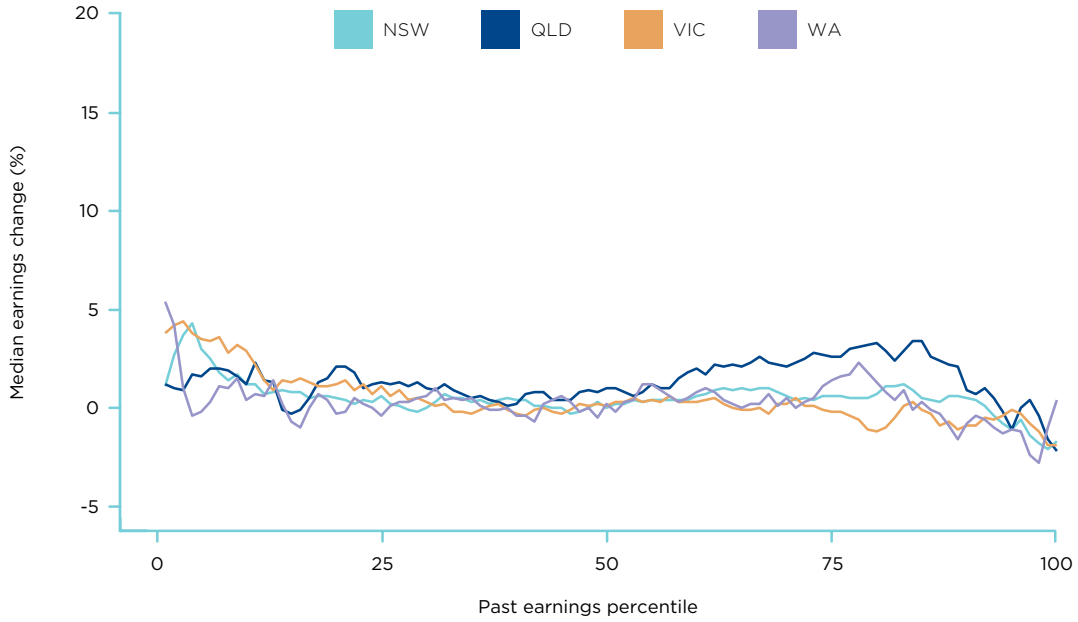
Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 5.7. Median earnings change, by past earnings percentile—Females living in the most populated states, 2007



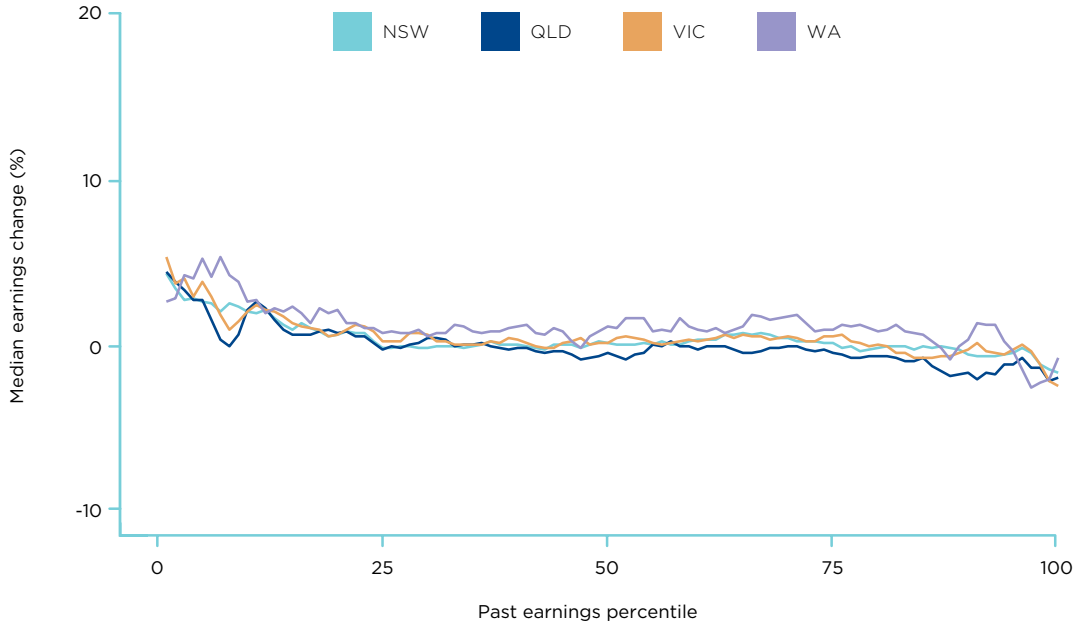
Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 5.8. Median earnings change, by past earnings percentile—Females living in the most populated states, 2010



Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 5.9. Median earnings change, by past earnings percentile—Females living in the most populated states, 2012



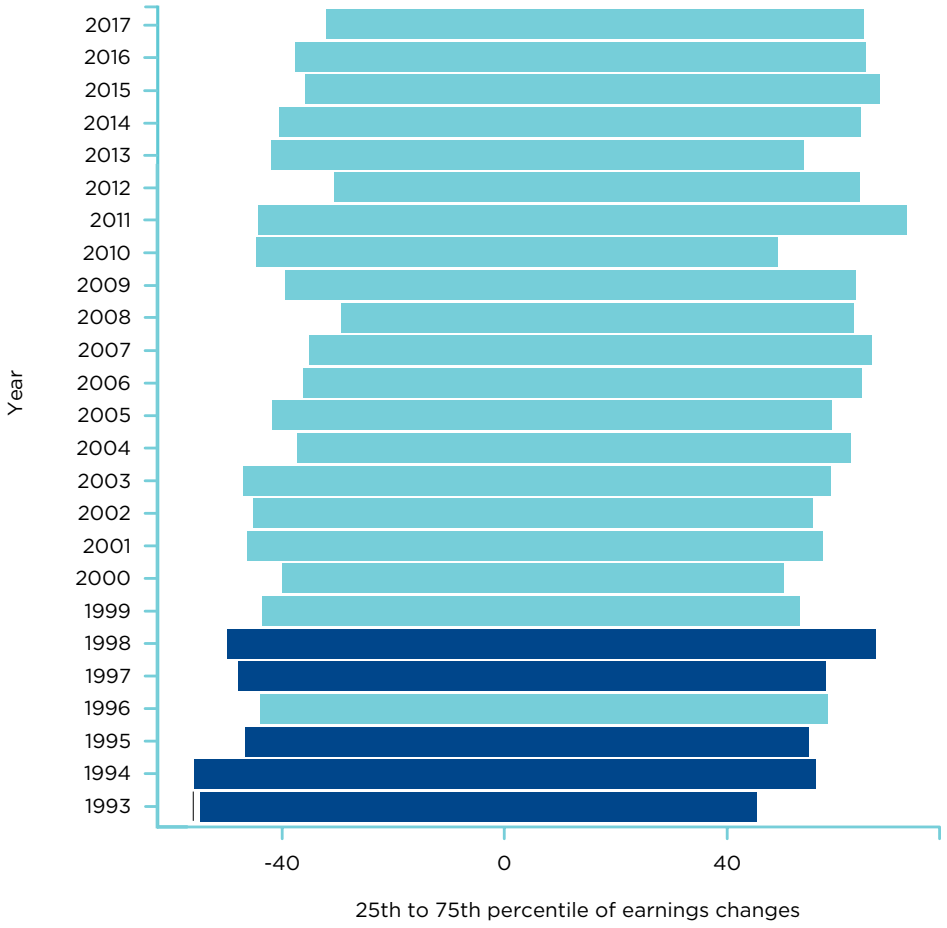
Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 5.10. Median earnings change, by past earnings percentile—Females living in the most populated states, 2017

Notes: The horizontal axis plots the percentiles of the past earnings distribution. Past earnings are calculated as the minimum earnings of the previous two years. In both years earnings need to be higher than a threshold which is defined as 25 percent of the annual minimum wage. The vertical axis plots the median earnings change. Earnings change is calculated as the percentage change between earnings in the current year and past earnings.

Figure 5.11 shows the interquartile range of earnings changes in each year for females in the bottom five percent of the past earnings distribution. For all years, most females at the bottom experience earnings growth, but a significant proportion have a fall in earnings. Note that the interquartile range for females is more compressed, indicating that when females experience positive changes their earnings grow less than males but when they experience negative changes their earnings decline less.

Figure 5.11. Earnings change variation, by year—Females in the bottom 5 percent of the past earnings distribution



Notes: This figure shows the dispersion in earnings changes for males at the bottom of the past earnings distribution (1st to 5th percentile). Past earnings are calculated as the minimum earnings of the previous two years. Earnings changes are calculated as the percentage change between earnings in the current year and past earnings. The right extreme of the interquartile range depicts the 75th percentiles of the distribution of earnings changes, and the left extreme the 25th percentile. Dark blue bars highlight the five years with the lowest 25th percentile of earnings changes.

Breaking Down Barriers

6. Conclusion

In this report we have examined earnings changes in Australia in each of the four macroeconomic periods from 1990 to 2020 identified by Garnaut (2021). Earnings growth was low in economic downturns (the early 1990s recession, the 2001 downturn and the GFC) and it was high in periods of strong economic growth (the productivity boom period in the mid-1990s and the resources boom period from 2001 to 2008). After 2012, in the Dog Days period, earnings growth slowed but was higher than during economic downturns.

Understanding the relationship between macroeconomic conditions and earnings changes is important when creating policies to fight poverty. These conditions can have negative (or positive) impacts on working that are countercyclical. Clearly evident from the analysis presented in this report is that macroeconomic policy is crucial to the fortunes of low-earning people. Policies that promote employment and productivity growth disproportionately benefit people at risk of poverty. Conversely, macroeconomic mismanagement or other sources of economic contraction disproportionately hurt low-income earners. In short, low earners' incomes are more sensitive to the business cycle than higher earners' incomes.

Finally, although the pictures for females and males are similar, earnings changes are generally larger in magnitude for males. This has two main implications. First, macroeconomic conditions are more important to the labour market fortunes of males than females. The second, less obvious, implication is that addressing low earnings and poverty of females requires greater emphasis on policies other than macroeconomic management. In particular, low earnings for females are linked much more to caring responsibilities than they are in the case of males (see, e.g., Ananyev et al., 2023). To better support the ability of females with young children to maintain earnings, it is important to implement policies that provide income support for those with young children and/or target supports such as child-care subsidies to increase labour market participation.

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Professor A. Abigail Payne

Professor A. Abigail Payne has been the Director and Ronald Henderson Professor at the Melbourne Institute: Applied Economic & Social Research since 2016. A driving force behind Professor Payne's work is the use of data and statistics to inform economic policy, especially in the area of public economics. Her research covers (a) the effects of policy on educational outcomes, transitions in schooling, gender differences in educational attainment, and student performance, (b) understanding donor and charity behaviour, and (c) exploring the determinants of poverty and disadvantage in Australia and identifying mechanisms and effective policies for reducing poverty. Her research has been published in top economic and public policy journals. In 2022, she was a Visiting Fellow at Hoover Institution (Stanford University, USA).

Prior to moving to Melbourne, Professor Payne was a professor of economics at McMaster University (Canada) where she was the inaugural director of MacDATA, McMaster's Big Data Institute, and the creator and director of the Public Economics Data Analysis Laboratory ('PEDAL') a secure data facility to address key public sector issues. She also has held positions at the University of Illinois and the University of Toronto, and she practised law for five years at a private law firm in Washington, DC. Previously Professor Payne was a Tier II Canada Research Chair in Public Economics, and she received a National Academy of Education/ Spencer Foundation Post-Doctoral Fellowship for her research on higher education issues. Professor Payne received her PhD from Princeton University. She holds a JD from Cornell University and a BA with honours from Denison University.

Professor Payne has been a driver behind the building of the Melbourne Institute Data Lab and the creation of shared data environments. She serves on many committees in Australia and internationally. This includes serving as a member of the Australian Statistics Advisory Council, chair of the ifo Institute's Scientific Advisory Council, co-editor of Economic Inquiry, member of the Asian and Australasian Society of Labour Economics Board, panel member of the Department of Treasury's Macroeconomic Group Economic Advisory Panel, member of the Go8 Economics Experts Panel, and board member of Brotherhood of St Laurence and University of Melbourne Partnership Board. During the pandemic she also served on ad-hoc committees for the City of Melbourne Economic Strategy and the Department of Premier and Cabinet (Victoria) Vulnerable Indices.

Professor Payne's projects include being the project lead for the Paul Ramsay Foundation Breaking Down Barriers Shared Data Environment, being a chief investigator for the ARC-COE Life Course Centre, developer of a partnership with Roy Morgan Research, part of a team that leads the development of the Taking the Pulse of the Nation survey, and an investigator on projects funded by the Austral Data Research Commons. She also has projects through the Lord Mayor's Charitable Foundation, the Victorian Department of Premier and Cabinet and the Victorian Department of Education.

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Roger Wilkins is Deputy Director of the Melbourne Institute as well as Deputy Director (Research) of the HILDA Survey program area.

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He has also produced the Australian income component of the World Wealth and Income Database (WID) since 2014.

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Dr Maxim Ananyev is a Research Fellow at the Melbourne Institute: Applied Economics & Social Research. He holds a PhD in Political Science from University of California, Los Angeles. He applies methods of computational social science to the issues of economic deprivation, discrimination, social capital, and political economy. His research has been published in peer-reviewed outlets and presented at various professional conferences in the disciplines of Economics, Political Science, Demography, and Computer Science. At the Melbourne Institute, Dr Ananyev works on several projects that use administrative data, such as Census records, tax records, health-related records to measure inequality, poverty and impact of policy changes on life of Australians.

He currently works on an ARC research grant that investigates non-standard forms of employment and fertility. He also works on a project funded by the Faculty of Business and Economics, University of Melbourne that studies the economic consequences of climate disasters.

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Federico Zilio is a Research Fellow at the Melbourne Institute, University of Melbourne. He received his PhD from the Institute of Social and Economic Research, University of Essex (UK). Prior to joining the Melbourne Institute, he undertook a Postdoctoral fellowship at the Faculty of Economics, University of Cambridge (UK).

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Dr Zilio has contributed to a report for the Fair Work Commission on low-paid workers in Australia and a report for the Australian Defence Force on the socioeconomic characteristics of the female population. He has also produced reports on the impact of COVID-19 and inflation on Australians' consumption behaviour.

He currently works on an ARC research grant that investigates non-standard forms of employment and fertility. He also works on a project funded by the Faculty of Business and Economics, University of Melbourne that studies the economic consequences of climate disasters.

Breaking Down Barriers

The *Breaking Down Barriers* report series provides in-depth analyses of questions that will help us to better understand the challenges faced by individuals, families, communities and governments that affect the existence and persistence of deep and entrenched poverty and disadvantage in Australia. The analyses have been undertaken by Melbourne Institute researchers and utilise economic and statistical techniques which involves developing shared data environments to study disadvantage and developing data visualisations.

This report has been produced as part of an ongoing partnership between the Paul Ramsay Foundation and the Melbourne Institute with the goal of informing and shaping policy and practice to break cycles of disadvantage. This includes improving our understanding of the extent, nature and causes of socioeconomic disadvantage in Australia and encouraging solutions that enable program development and policy innovation that foster opportunity and reduce poverty and disadvantage.

Melbourne Institute: Applied Economic & Social Research

The Melbourne Institute is a research-only, academic department in the Faculty of Business and Economics at the University of Melbourne with over 60 years of experience informing and shaping economic and social policy. The Melbourne Institute's list of longstanding accomplishments includes playing an active role in the establishment of the Henderson Poverty Line (by inaugural director Ronald Henderson), the development of the blueprint for Medibank/Medicare (John Deeble and Dick Scotton), the execution of the HILDA Survey and resulting analyses (Mark Wooden), the creation and running of the *Australian Economic Review*, the establishment of the consumer sentiment index (our longest-running survey having been established in 1973 and now conducted in partnership with Westpac), and a host of many other achievements that have resulted from the engagement of researchers as part of the bedrock that informs macroeconomic, microeconomic and social policy in Australia.

The Melbourne Institute is home to more than 50 economic researchers who are supported by survey methodologists and data scientists. Their work is recognised internationally by both academic and policy communities. All work undertaken by the Melbourne Institute is independent and impartial.

From the Institute's inception, researchers have been engaged in understanding poverty and disadvantage from a range of perspectives. This work has been in partnership with other organisations such as the Brotherhood of St Laurence, as a node of the ARC-funded Centre of Excellence for Children and Families over the Life Course, and a range of commonwealth and state government departments. Current projects that affect our understanding of poverty or disadvantage include studies to understand employment, family dynamics, social housing, tax and transfer policies, consumer expectations, the delivery of health care, intergenerational disadvantage and studies of particular populations in Australia.

Paul Ramsay Foundation

The Paul Ramsay Foundation seeks to identify and partner with individuals, communities and organisations working to create an Australia where people can overcome disadvantage and realise their potential.

The late Paul Ramsay AO established the Foundation in 2006 and, after his death in 2014, left the majority of his estate to continue his philanthropy for generations to come.

His commitment to good works has allowed the Paul Ramsay Foundation to support the for-purpose sector with grants of more than $350 million made since 2016 to more than 90 different partners, committed as the Paul Ramsay Foundation is to achieving lasting change.