Australian Government
Productivity Commission

Trends in the Distribution of Income in Australia

Productivity Commission
Staff Working Paper

March 2013

Jared Greenville
Clinton Pobke
Nikki Rogers

ISBN 978-1-74037-430-9

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Publications Inquiries:
Media and Publications
Productivity Commission
Locked Bag 2 Collins Street East
Melbourne VIC 8003

Tel: (03) 9653 2244
Fax: (03) 9653 2303
Email: maps@pc.gov.au

General Inquiries:
Tel: (03) 9653 2100 or (02) 6240 3200

An appropriate citation for this paper is:

Greenville, J., Pobke, C. and Rogers, N. 2013, *Trends in the Distribution of Income in Australia*, Productivity Commission Staff Working Paper, Canberra.

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Acknowledgments

The authors wish to thank the following people for their help and advice in the production of the paper: Peter Whiteford (ANU), Roger Wilkins (University of Melbourne), Bindy Kindermann and Heather Burgess (ABS) and Jenny Gordon, Paul Gretton, Ralph Lattimore, Lisa Gropp, Noel Gaston and Alan Johnston (Productivity Commission).

The views in this paper remain those of the authors and do not necessarily reflect the views of the Productivity Commission or of the external organisations and people who provided assistance.

Abbreviations

ABS	Australian Bureau of Statistics
ATO	Australian Tax Office
CURF	Confidentialised Unit Record Files
GST	Goods and Services Tax
HES	Household Expenditure Survey
HILDA	Household, Income and Labour Dynamics in Australia
OECD	Organization for Economic Cooperation and Development
PC	Productivity Commission
SIH	Survey of Income and Housing
USA	United States of America

OVERVIEW

Key points

- Between 1988-89 and 2009-10, the incomes of individuals and households in Australia have risen substantially in real terms and in comparison to trends in other OECD countries, with particularly strong growth between 2003-04 and 2009-10.
  - The increase has mainly been driven by growth in labour force earnings, arising from employment growth, more hours worked (by part-time workers) and increased hourly wages.
- While real individual and household incomes have both risen across their distributions, increases have been uneven.
  - The rate of growth has been higher at the 'top end' of the distributions than the 'bottom end'.
  - Incomes for those in the middle of the distribution have spread out (that is, they have become less concentrated around the average).
- These changes underlie the recently observed increases in summary measures of inequality (such as the Gini Coefficient) in Australia for individual and household incomes.
  - At the individual level, the key drivers are the widening dispersion of hourly wages of full-time employees and (to a lesser extent) the relatively stronger growth in part-time employment.
  - At the household level, the key driver has been capital income growth amongst higher income households. The impact of growing dispersion of hourly wages on the distribution of labour income has been offset by increased employment of household members including a decline in the share of jobless households.
- Final income is also influenced by government taxes and transfers. These have a substantial redistributive impact on the distribution of household income, substantially reducing measured inequality.
- Although the progressive impact of the tax and transfer system declined slightly from the early 2000s (with the introduction of the GST and a fall in the number of recipients of government benefit payments associated with higher employment), real growth in the value of direct and indirect transfers contributed to growth in incomes for low income households.
- The analysis highlights the need to examine the changes in various income components and population subgroups in order to understand the changes in the distribution of income and inequality measures such as the Gini coefficient.
  - Differences in individual income, and therefore household income levels, occur for a variety of reasons including personal choices and innate characteristics as well as opportunities and inheritances. These differences combine with broader economic forces and policy settings to influence the distribution of income over time.

Overview

Variation in incomes is a feature of all economies. At any point in time, some individuals and households earn relatively less, while others earn relatively more, resulting in a distribution of different incomes. Differences in individual incomes occur for a variety of reasons including personal choices and innate characteristics (such as age, intelligence and choices made over work life balance) as well as opportunities and inheritances. These individual differences combine with broader economic forces and policy settings to influence the distribution of income over time.

The measurement and analysis of the distribution of income, including the analysis of inequality in incomes, are the focus of a well-established academic literature.[1] This paper seeks to contribute to the existing analysis by examining what has happened to the distribution of income in Australia since the late 1980s, at both the individual and household level. Distributional changes are explored along with changes in summary measures of income inequality, such as the Gini coefficient, according to its technical meaning used within the academic literature.

A 'build-up' approach to income has been adopted, exploring first individual and then household income. This allows for the factors that influence individual income, such as the returns individual workers obtain from participating in the workforce, to be traced through to household income which is affected by a broader set of demographic, social and government policy influences. In doing so, changes in the distribution of income from various sources and for population subgroups are explored in detail, with a particular focus on types of employment, working hours, hourly wages, taxes and transfers and household composition. Figure 1 depicts the income sources and population groups examined.

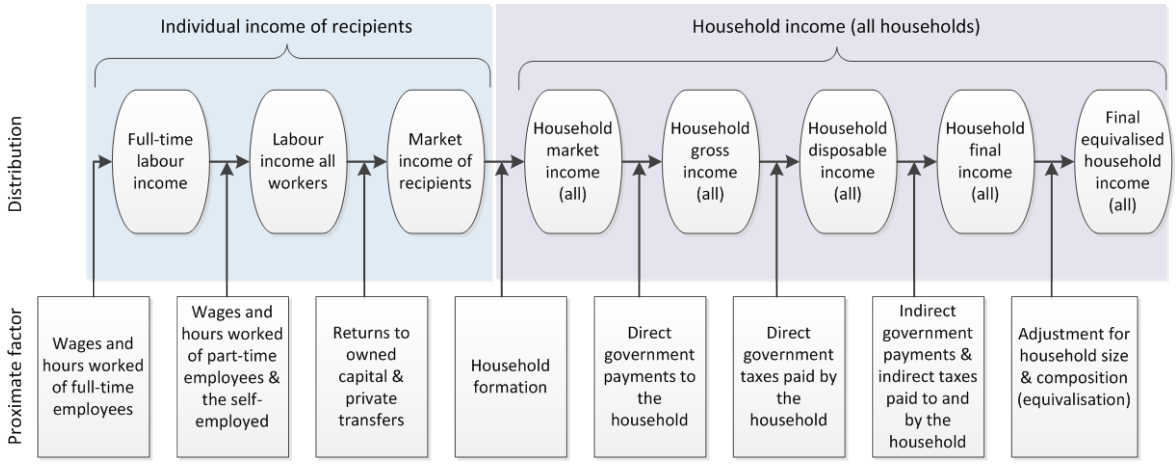
The 'build-up' approach also helps to provide insights into changes in summary distributional measures — such as the widely used Gini coefficient. The approach also highlights the need for care when making assessments based on such summary measures alone.

The analysis makes use of data from five Australian Bureau of Statistics' Household Expenditure Surveys (HESs), conducted from 1988-89 to 2009-10. The

1 See Nolan, Salverda and Smeeding (2011) for a comprehensive survey of the income inequality literature.

resulting changes identified, therefore, relate to this period and will be influenced by the specific characteristics of the start and end points — such as the economic, demographic and social conditions that prevailed. Given survey timing, only five snapshots of the distribution of income are available. However, the HES includes information on direct and indirect government transfers and taxes, making it an appropriate data source to examine various components of income in detail.[2]

Figure 1 **The 'build up' approach to income**



The broader context of increasing incomes in Australia over the past 20 years

The context for any analysis of Australia's income distribution over the last 20 years is the widespread increases in real incomes driven by the growth in the Australian economy. Individual labour earnings have increased by around 38 per cent on average, while 'equivalised' final household incomes (which additionally includes direct government payments, the provision of government funded services (indirect transfers) and taxes, and takes into account household size and composition) increased by 64 per cent (figure 2).[3] Real income growth has occurred 'across the board' — that is, for the lowest to highest income groups.

2 All surveys suffer from misreporting and non-response bias — the HES is no different. However, with the quality assurance practices of the ABS and a large sample size, these should be minimised. It should also be noted that compulsory superannuation payments are not treated as income for workers. Instead, as per international convention, superannuation is treated as income when it is drawn down.

3 Household incomes are adjusted to reflect the requirement of larger households to have a higher level of income to achieve the same standard of living. This process, called equivalisation, adjusts household income by a factor related to the size and composition of the household. The Australian Bureau of Statistics equivalisation factor has been used in this study and is equal to

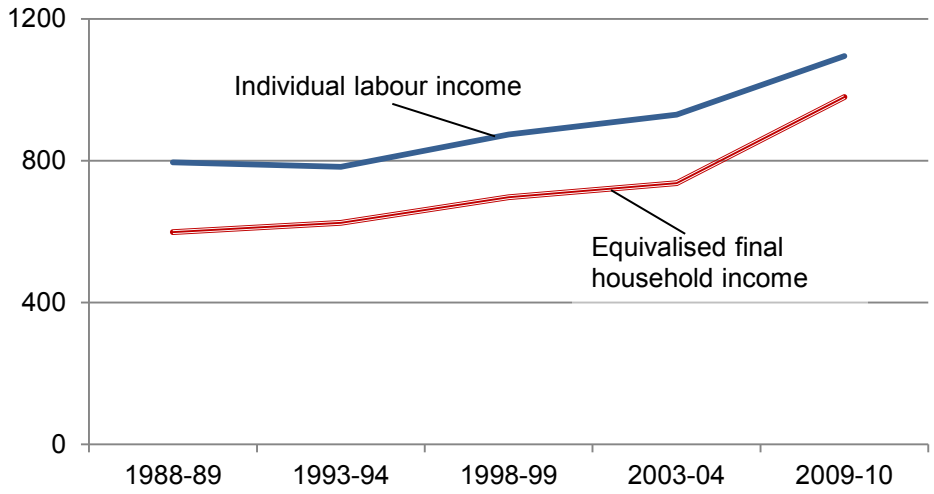
Over the last 20 years, around 75 per cent of the growth in real household earnings has come from increased labour force earnings. This reflects:

- *Increased employment*— the proportion of adults in paid employment per household increased from 56 per cent in 1988-89 to 60 per cent in 2009-10.
- *Longer working hours amongst part-time workers* — average hours worked by Australians with part-time jobs has grown by around 16 per cent, from 17.6 hours in 1998-99 to around 20.4 hours in 2009-10.[4]
- *Increased real wages* — between 1998-99 and 2009-10 real hourly wages increased by 22.7 per cent for full-time workers and 8.1 per cent for part-time workers.

That is, between 1988-89 and 2009-10, more Australians joined the labour force, got jobs, worked longer hours and were paid more per hour.

Figure 2 **Individual and equivalised final household incomes, 1988-89 to 2009-10**

Inflation adjusted 2011-12 dollars



While these economic gains have been widespread, they have not been uniform. Growth for those in the top half of the distribution (above the median) has been greater than for the bottom half (in both absolute value and proportionate terms). This is true both in terms of individuals' market based earnings (from the supply of labour and returns to capital plus private transfers) as well as in terms of equivalised

the inverse of the sum of 1 times the number adults plus 0.5 times the number of children present in the household.

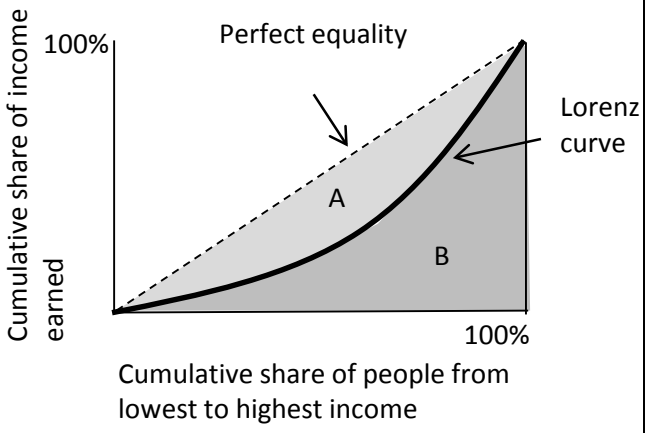
4 Due to data constraints, hours worked and hourly wage rate analysis is not possible for 1988-89 and 1993-94.

final household income. The different rates of growth at the top and bottom of the income distribution, along with movements in summary measures such as the Gini coefficient (box 1), underlie the observation that income inequality has risen in Australia in recent years as widely reported by the OECD (2011) and researchers including Leigh (2005), Whiteford (2011) and Wilkins (2013) amongst others.

Box 1 **What is the Gini coefficient ?**

The Gini coefficient can be depicted graphically using the Lorenz curve, which depicts the cumulative income shares against cumulative population share.

The curvature of the Lorenz curve depicts the level of inequality. If all individuals (or households) had the same income (perfect equality), then the curve would lie along a 45 degree ray from the origin. The Gini coefficient is the ratio of the area enclosed by the Lorenz curve and the perfect equality line (A) to the total area below the perfect equality line (A+B). It ranges from 0 (perfect equality) to 1 (perfect inequality).



Source: Jenkins and Van Kerm (2008).

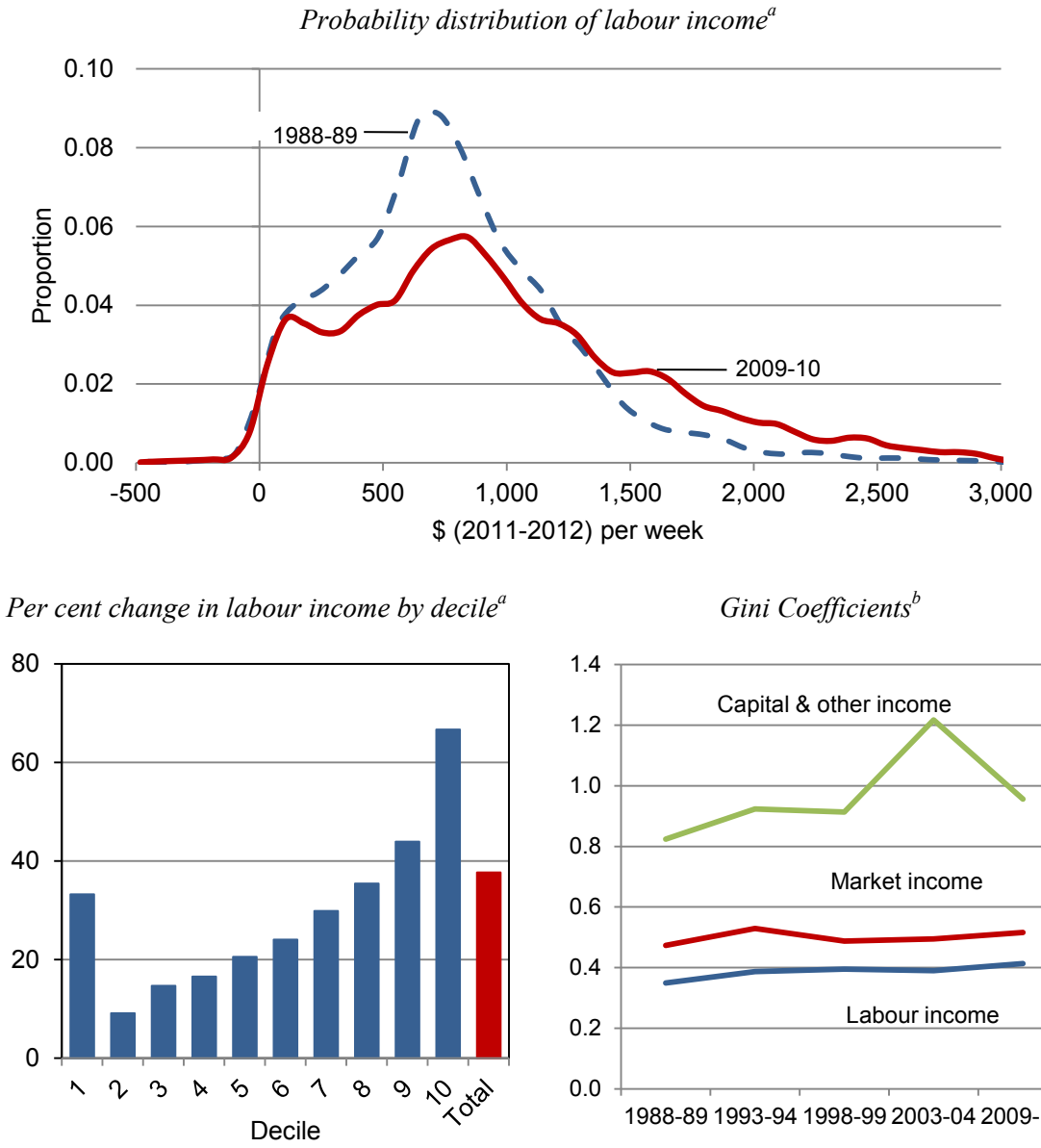
Given the complex nature of income inequality, detailed analysis of the underlying distributional change is necessary in order to understand the nature and significance of changes in simple aggregate measures.

What has happened to individual earnings?

An individual's market income is made up of labour earnings (from working full-time, part-time or being self-employed) and 'capital & other' income (such as interest from savings, dividends from shares, rents from investment properties and private transfers). Capital & other income is concentrated in the higher income groups and has become more so over time. Measured levels of inequality are sensitive to reported investment losses and have varied over time, but rose in aggregate between 1988-89 and 2009-10. However, it is a small proportion of overall market income (around 11 per cent in 2009-10).

Figure 3 **Movements in the distribution of individual labour income, 1988-89 to 2009-10**

Inflation adjusted 2011-12 dollars



a For people reporting labour incomes. Negative incomes are present in the data as these represent losses from an individual's own unincorporated business **b** For people reporting incomes in each category. Capital & other income Gini coefficient estimates exceed 1 in 2003-04 as some individuals report negative incomes from own unincorporated businesses.

Labour income is the most important component of market income for most (figure 3, top panel). The distribution of labour income of workers has shifted to the right (indicating rising average incomes) and flattened (indicating greater spread of income). The 'top' tail of the distribution has also lengthened. These effects have led to the increase in the Gini coefficient from 0.35 in 1988-89 to 0.41 in 2009-10

— indicating rising inequality in labour incomes amongst those employed at the individual level (changes are all statistically significant at the 1 per cent level).

Changes in full-time, part-time and self-employed subgroups, as well as increased employment, also help to explain the observed changes in the distribution of individual labour incomes. The different characteristics of these workers subgroups have both level and trend effects on measured inequality.

In terms of the *level* effect, a large part of labour income inequality simply reflects differences in the average earnings of the different types of worker. Taken alone, measured inequality amongst full-time workers (around 62 per cent of the workforce in 2009-10) is considerably lower than for labour earnings overall (Gini coefficients of 0.31 and 0.41 respectively). When full-time workers are combined with part-time workers (who have lower average incomes), measured inequality increases.[5] Decomposition analysis suggests that differences in average earnings between different types of worker account for around half of labour income inequality.[6]

The effect of pooling worker groups on aggregate distributional *trends* depends on changes in the relative share of each in the total workforce. Between 1988-89 and 2009-10, the share of the workforce employed part-time has increased alongside increased participation rates, particularly amongst women. As part-time workers earn considerably less on average than full-time and self-employed workers, this compositional change has increased measured inequality amongst those employed. Increased overall employment rates that have occurred with the increased share of part-time workers in the workforce, however, have had a different effect on measured levels of household income inequality (discussed below).

In addition to the changing composition of the workforce, much of the measured increase in income inequality for individuals has been due to the distributional changes that have occurred within worker subgroups — particularly amongst full-time workers. While full-time workers have the most equal distribution of income, they also exhibit the clearest upward trend in inequality over the last 20 years. On the other hand, measured inequality has been relatively stable among part-time workers while the trend is unclear for the self-employed. Rising weekly income inequality among full-time workers has been due to the dispersion of hourly wages

5 Only the self-employed — who by far have the most unequal distribution of income — have a Gini coefficient (0.59) that exceeds that of overall labour force earnings.

6 A subgroup decomposition was used to identify how much of the income variation that occurs within a subgroup, compared to that which exists between subgroups, contributes to the overall Gini coefficient result.

between high and low earners. Hours worked by full-time workers have been relatively stable across all income levels.[7]

While changes in the distribution of income can be examined in a multitude of different ways, two areas attract particular attention — the gender pay gap and incomes of the very top earners (the top '1 per cent'). Both involve complex causes and effects and have attracted considerable debate. However, in terms of summary distributional measures such as the Gini coefficient, HES data suggest that:

- the top 1 per cent have not been relatively more important in explaining movements in labour income inequality compared to other earners. Noting that while, as a group, it is more difficult to accurately measure the incomes of the top 1 per cent due to generally lower survey response rates, data from the HES suggests the top 1 per cent of labour force earners make a modest impact on measures like the Gini coefficient across survey periods (removing this group from the income distribution lowers the Gini coefficient by 6.5 per cent). However, their contribution to the Gini has been consistent in the data from each survey — rising inequality in Australia is also driven by the 99 per cent, not just the 1 per cent.
- the gender pay gap appears to be a relatively minor component of measured individual labour income inequality. Decomposition of most indicators suggest that less than 3 per cent of measured inequality is driven by difference in average hourly rates of pay between men and women (the highest estimate was 15 per cent). The overall increase in labour income inequality between 1988-89 and 2009-10 appears to have been a result of factors that affect men and women in similar ways.

What has happened to household income?

The household story is both more complex and more important in economic welfare terms. While market income (at the individual level) describes the distribution of income arising from individuals' interaction with the economy, ultimately equivalised final household income has the greatest impact on an individual's consumption and material living standards. The Gini coefficient for equivalised household income has increased from around 0.25 in 1988-89 to around 0.27 in 2009-10, with most of this increase occurring since 2003-04.[8]

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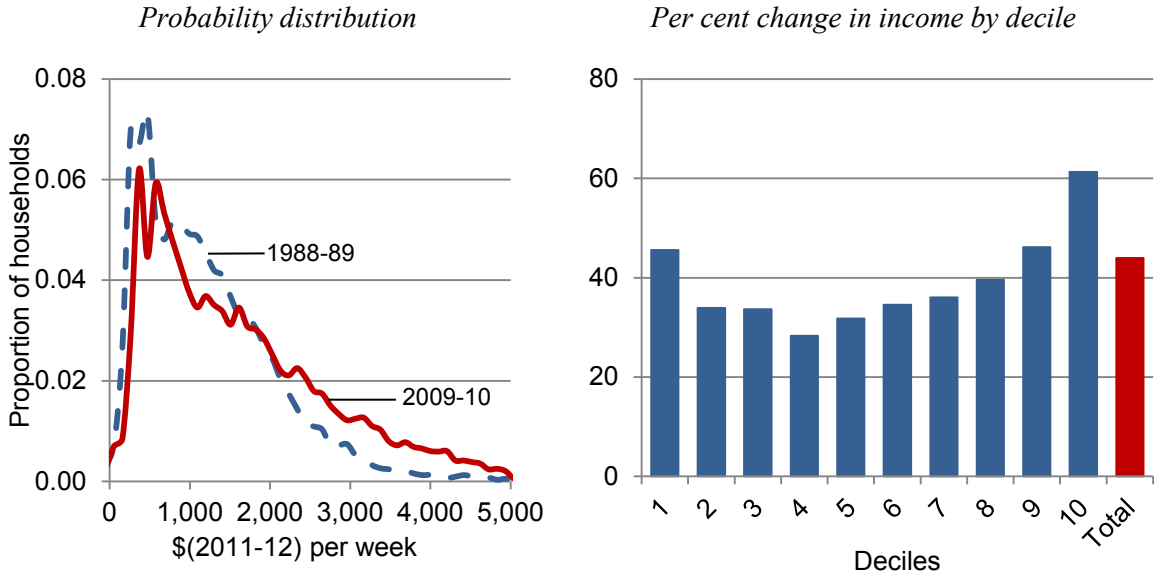
7 However, there is considerable cross sectional variation in hours worked by full-time employees, with the highest decile working around 10 hours longer per week than those in the first decile.

8 These changes are statistically significant at the 1 per cent level.

The movements in the distribution of final equivalised household incomes are predominantly the result of changes in gross household income (pre-tax market income and direct government transfers). The basic distributional shifts in gross household income (figure 4, left panel) appear similar to those based on individual income measures. However, at the household level, this is not a story of higher deciles experiencing greater income growth than lower deciles (as is the case in terms of individual market earnings). Rather a U-shaped growth pattern is observed (figure 4, right panel). This indicates high growth at the bottom of the distribution (tending to decrease inequality), moderate growth at the middle (with an ambiguous effect on inequality), and very high growth at the top (tending to increase inequality). That is, there are both convergent and divergent forces affecting household income, with the latter dominating overall.

Figure 4 **Change in gross household incomes, 1988-89 and 2009-10[a]**
Inflation adjusted 2011-12 dollars



[a] All households.

The income sources underpinning these changes differ by decile.

- At the bottom of the distribution, increases in government payments have been very important. In particular, increases in government payments (particularly related to the Aged Pension) accounted for, on average, around 45 per cent of income growth in the 1st decile and 57 per cent of income growth in the 2nd decile. The impact of government payments diminishes for higher deciles, but still comprises around 4 per cent of the income growth of the 9th decile.
- Labour income is the biggest source of growth for most households, but is particularly important for the 6th to 9th deciles (above 70 per cent).

- Capital & other income has grown relatively evenly across most deciles, but has had the biggest effect on the 10th decile. This 'top-end' capital income growth occurred mainly between 2003-04 and 2009-10 (more than doubling in this period).

The combined result of these changes is that there is no clear trend in measured gross household income inequality between 1988-89 and 2003-04. The Gini coefficient only increased slightly from 0.39 in 1988-89 to 0.40 in 2003-04. Since 2003-04, however, measured inequality rose — to 0.43 by 2009-10. The top-end growth in capital & other income is the main driver of the change between 2003-04 and 2009-10. But even with capital & other income included, both the level and the growth in household inequality is lower than that experienced by individuals — a result of the equalising effect of household members combining income, a greater proportion of household members working, as well as government payments targeting people on lower incomes (discussed further below).

In contrast to individual market income, changes in household labour earnings have not contributed to the recent increase in measured gross household income inequality. The difference arises because individual market income only includes people that are working (or have some capital & other income) and does not capture the distributional consequences of the marked increase in employment. This increase has been most prevalent among families in the bottom half of the income distribution and among households containing dependent children — employment for sole parent families and couples increased by around 11 per cent and 6 per cent, respectively. As people in these groups would have otherwise earned no labour income, the increase in employment exerts an equalising force on the distribution of income that offsets the dispersion of average hourly wages.

Demographic and social factors, such as family formation and age, have some readily observable impacts on the distribution of (gross) household income. For example:

- the vast majority of households at the bottom of the distribution (the 1st and 2nd deciles) are either lone persons or single parents. Around half of these households have an average adult age over 65. Fewer than 21 per cent contain an employed adult.
- conversely, the top of the distribution (the 9th and 10th deciles) is made up almost entirely of working age households, with 80 per cent of resident adults in the labour force. Almost all of these households contain couples.

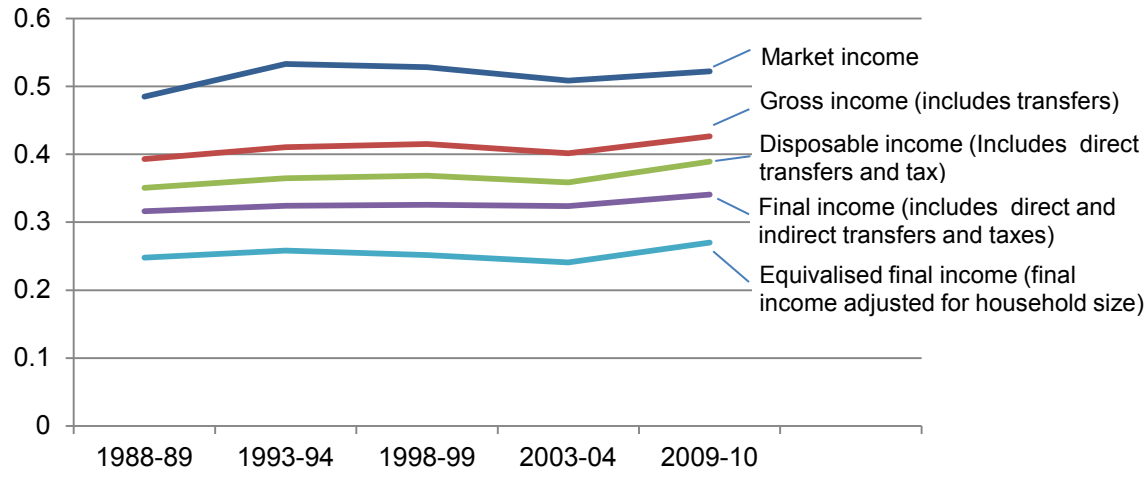
Family formation can also directly affect household inequality if people with higher earnings tend to partner with other people with high earnings. The OECD (2011)

found that this partnering pattern has been an important contributor to rising inequality in the 1980s and 1990s, both in Australia and internationally. In practice, this phenomenon is difficult to observe, generating some uncertainty as to its importance. At any rate, between 1998-99 and 2009-10, rates of partnering between people with similar individual earnings appear to have stabilised, suggesting its role in explaining distributional changes, if any, would have diminished over the last decade.

At the other end of the spectrum, the proportion of households with no employed members (jobless households) has been in decline since 1993-94. This has contributed to the growth in household incomes and exerted downward pressure on measured inequality. However, during this period, the average income gap between households with employed members and jobless households increased.

Finally, government tax and transfer policies (both direct and indirect) substantially decreased measured income inequality (figure 4). In 2009-10, the combined effect of taxes and transfers was a reduction in the Gini coefficient from 0.52 (household market income) to 0.34 (final income) — slightly lower than in previous years. Taking account of household size (in particular the economies of scale in consumption when working adults cohabitate), further reduces the Gini coefficient to 0.27 (equivalised final income).

Figure 5 **The impact of taxes, transfers and household size on the Gini coefficient[a], 1988-89 to 2009-10**



a All households.

The impact on inequality of Australia's system of taxes and transfers varies. Some parts of the system, such as consumption taxes, make the distribution of household

income less equal (though this effect is relatively minor). In general, however, the tax and transfer system reduces inequality through a number of means.

Direct transfers

These include government payments such as the Age Pension, the Disability Support Pension, unemployment benefits and Family Tax Benefits (A and B). These payments, by design, are targeted toward individuals and families on lower incomes and reduce income inequality considerably. In 2009-10, direct transfers accounted for around half of the total fall in inequality between market and final income.

As employment has increased, the share of households receiving direct payments has decreased, although for those that do receive payments, amounts have risen significantly in real terms (from $266 in 1993-94 to $346 in 2009-10 in 2011-12 prices). The relative decline in the number of transfer recipients has also reduced the marginal effect of transfers on household inequality (the percentage reduction associated with an increase in the average level of benefits has become smaller).

Overall, despite considerable growth in the value of direct transfers, the impact on inequality has also diminished. Direct transfers lowered inequality of equivalised market income by 28 per cent in 1993-94 and 23 per cent in 2009-10.

Direct taxes

Primarily comprising income tax, taxes reduce inequality by taxing those on higher incomes at a higher rate. In 2009-10, direct taxes accounted for around 18 per cent of the total reduction in inequality between household market and final income. Over time, the equalising effect of direct taxation has diminished slightly — lowering inequality of equivalised market income by 9 per cent in 2009-10 compared with 10 per cent in 1993-94.

Indirect transfers

These refer to the direct provision of services such as education, health, housing and childcare assistance (together, education and health comprise 83 per cent of indirect transfers). While all Australians are entitled to these services, they make up a greater share of final income for those on lower incomes, reducing measured inequality. In 2009-10, indirect transfers account for around 37 per cent of the fall in inequality between market and final income. Indirect transfers have increased by around 77 per cent in real terms since 1993-94 and, due to the relatively high share of indirect benefits in gross income for those in lower deciles, the increases have

helped to further reduce inequality — reducing measured inequality of equivalised market income by 17 per cent in 2009-10 compared with 15 per cent in 1993-94.

Are the distributional movements in Australia different from other countries?

Some of the observed developments in Australia's income distribution between 1988-89 and 2009-10 are also evident in other OECD countries. The stronger growth in incomes for those (individuals and households) at the top of the distribution compared with those at the bottom has also occurred in most other OECD countries. In particular, the growing dispersion in full-time earnings, especially amongst men, is commonly observed across OECD countries.

However, in contrast to other OECD countries, the growing dispersion in full-time earnings has not translated into a greater spread of household labour earnings in Australia. Australia's increases in workforce participation and employment, particularly for households in lower income deciles, have more than offset this development. In other words, growth in labour force participation and hours for part-time workers and declining unemployment have meant that labour market earnings have had a moderating impact on measured household labour income inequality.

1 About this study

Since the early 1990s, Australia has experienced its longest period of continuous economic growth on record and associated rise in household incomes. It has also avoided some of the more severe effects of the global financial crisis.

Average real household incomes in most OECD countries have grown over the past 20 years — a notable exception is United States for which median real household incomes have fallen over the past decade (OECD 2012a). Rising income levels, however, have been accompanied by a widening of the distribution of income in most OECD countries (and many developing countries). As noted by the OECD (2011):

> Over the two decades prior to the onset of the global economic crisis, real disposable household incomes increased by an average 1.7% a year in OECD countries. In a large majority of them, however, the household incomes of the richest 10% grew faster than those of the poorest 10%, so widening income inequality. Differences in the pace of income growth across household groups were particularly pronounced in some of the English-speaking countries, some Nordic countries and Israel. (p. 22)

The OECD (2011) reports that Australia's experience has been similar, albeit with higher rates of growth in both income (across the entire distribution) as well as inequality. Understanding these trends requires an examination of changes observed in sub-groups (such as full-time versus part-time workers), different units of analysis (such as between individual versus households) and types of income (such as market income and government payments). For convenience, these are referred to as 'proximate factors' in this paper. This is the focus of this paper.

This area of inquiry is of ongoing relevance to the Commission's work. In analysing the overall effectiveness and efficiency of government policies, the Commission is often asked to also consider the distributional impacts (for example, PC 2005 and 2009). Distribution changes, and specifically trends in inequality, are important because:

- growth in average income is a widely used indicator of economic and social progress. Yet aggregate measures can conceal important information about the experience of different groups and different individuals. Understanding distributional trends and what lies behind them enriches our knowledge of the performance of the economy.

- people care about inequality, and it influences government policy. Better information about factors underlying changes in measured inequality can help better inform future policy.

1.1 What this paper is about

This staff working paper examines the recent trends in Australia's individual and household income distributions. It examines the proximate factors that help explain aggregate trends to provide a more detailed understanding of the composition of the income distribution (in terms of both the groups represented within it and the different kinds of income they receive). It also examines whether the Australian experience mirrors general trends across OECD countries.

The approach of this paper is to 'build-up' from basic units of analysis and income measures to more comprehensive ones (detailed in the following section). The remainder of this chapter outlines the data used and 'tool kit' of techniques typically used in distributional analysis and some of their limitations.

Chapter 2 examines trends in the distribution of individual market income. The market incomes of different groups are analysed, with a particular focus on full-time, part-time and self-employed workers. This chapter breaks market income down into its two main sources — labour and capital, with a particular focus on the former (which is the largest source of market income). The unit of analysis throughout chapter 2 is the individual.

Chapter 3 examines how changes in different types of income contribute to the distribution of household final equivalised income (this concept is explained in the following section). This involves examining how the distribution (and its trends) changes when government transfers, taxes and the effects of household size are considered. Several different population groups are considered including family types (such as single, dependent children amongst others), working and non-working age and jobless households. The unit of analysis throughout chapter 3 is the household.

The final chapter places these findings in context by comparing Australia with broader OECD trends. It also suggests possible areas of future work.

1.2 Measuring income and its distribution

Measuring the distribution of income is not straightforward. First, 'income' needs to be defined. Second, the aspects of the distribution to be measured and how these should be estimated need to be determined. These issues are briefly discussed below.

'Building up' to household income

People receive income from a number of sources. At the most basic level, income comprises the remuneration *individuals* receive in exchange for their labour (paid employment or self-employment), earnings on investments (such as property, shares or from funds held in interest bearing deposits) and other private transfers. The former is referred to as *labour income* and the latter is referred to as *capital & other income*. Combined, these form *market income*.

Many people also receive direct transfers from government. These include the Aged Pension, the Disability Support Pensions, unemployment benefits, Family Tax Benefit A and Family Tax Benefit B, amongst others. Market income combined with direct transfers is referred to as *gross income*.

As many of these payments are calculated based on household level characteristics (for example, some depend on the number of children present or household income) it is useful to analyse *gross income* (and subsequent measures of income) at the household level. Additionally, using households as the unit of analysis is a better guide to the financial resources that individuals have access to than their individual market income. This is because many households share income and divide paid (employment) and unpaid (such as caring for children) labour differentially among household members (for example, the labour income of the primary carer of a newly born child will often be less than the financial resources to which that person has access to).

As people are required to pay tax on their income, the amount of money they actually receive is generally less than their gross income (providing their income exceeds tax free thresholds). Gross income minus direct taxation obligations is known as *disposable income*.

In addition to direct payments, governments also supply a range of public services either free of charge or at subsidised rates which can be considered as 'income in-kind'. This represents an indirect transfer. At the same time, the amount of goods and services individuals can purchase with their disposable income is reduced by taxes that occur at the point of sale (indirect taxes). To account for these factors the

Stiglitz-Sen-Fitoussi Commission (Stiglitz et al. 2009) noted that when examining household income, the most comprehensive measure is one that takes:

> … account of payments between sectors, such as taxes going to government, social benefits coming from government, and interest payments on household loans going to financial corporations. Properly defined, household income and consumption should also reflect in-kind services provided by government, such as subsidized health care and educational services. (p. 13)

In practice, detailed measures of in-kind services are often unavailable (this is a motivating factor in the data set chosen for this study, which is discussed in the following section).

Income measures which take into account in-kind services in addition to taxes and transfers are usually termed 'adjusted disposable household income' or *final income*. The later term is used by the Australian Bureau of Statistics (ABS) and is adopted in this paper.

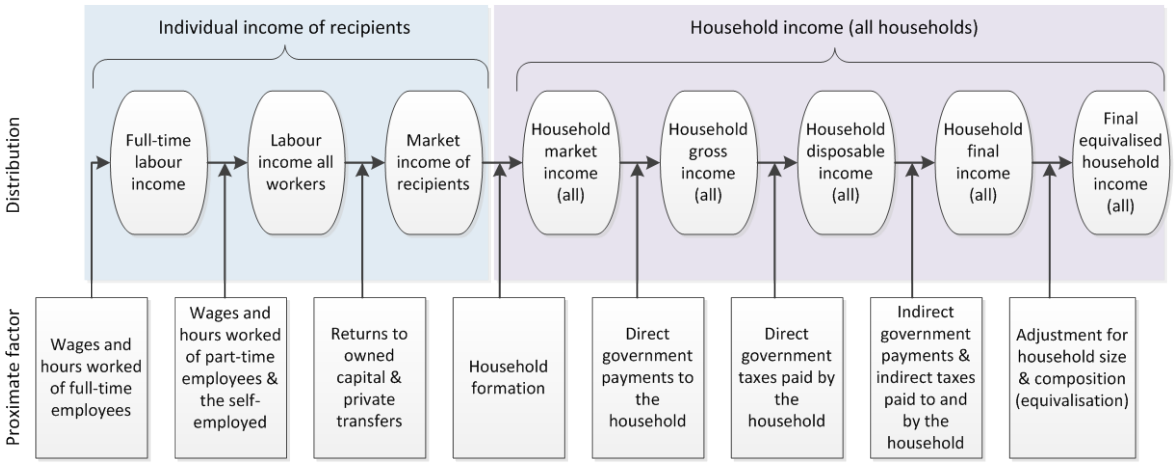
Finally, in order to link the total income available to each household to actual resources available to its members, the size and composition of the household (that is, the number of people and their age) needs to be taken into account. The material requirements of households grow with each additional member. However, due to economies of scale in consumption, these requirements are not necessarily proportional to the number of household members.[1] Equivalising household income attempts to account for this.[2]

Final equivalised household income provides a more complete picture of the resources available to people, how they are distributed, and how this distribution has changed. However, understanding changes in this measure requires analysis of changes in its constituent parts. This building up of the income distribution in Australia is illustrated in figure 1.1.

1 For example a two-person household may use less than twice the electricity of a one person household.

2 The equivalisation approach in this study follows that of the ABS. The equivalising factor applied to household income is calculated using the 'modified OECD' equivalence scale. The equivalising factor is determined by applying a score of 1 to the first adult in the household, with each additional adult (those 15 years or older) allocated 0.5 points, and each child under the age of 15 allocated 0.3 points.

Figure 1.1 **Building up to the distribution of equivalised final income**[a]



[a] Labour income estimates from the HES do not include compulsory superannuation payments. Instead, as per international convention, superannuation is treated as income when it is drawn upon and treated as such by individuals.

Data on the distribution of income in Australia

This paper draws on the Household Expenditure Surveys (HESs), undertaken by the ABS. This survey collects detailed information about the expenditure, income, assets, liabilities and characteristics of households resident in private dwellings throughout Australia. The survey was undertaken in 1984, 1988-89, 1993-94, 1998-99, 2003-04 and 2009-10. In the most recent year the sample size was 9774 households. Due to issues with data consistency, this working paper has only examined HESs from 1988-89 onwards. In some cases, data items were not collected in earlier years, further limiting the period considered (for example, information on imputed private rent is only available in the 2009-10 survey and the measurement of hours worked by individuals is too coarse prior to 1998-99 to estimate hourly wage rates).

The HES has a number of attractive features for examining the distribution of income in Australia. The Survey of Income and Housing (SIH) and the Household Income and Labour Dynamic in Australia (HILDA) survey are frequently used in the analysis of Australia's income distribution. There has been relatively little analysis of the HES (in particular prior to it merging with the SIH in 2003-04).

The HES was chosen for this study as it contains a richer set of forms of income, from market (labour and capital) to government payments (direct and indirect) along with taxes (direct and indirect). The inclusion of indirect taxes and transfers allows for the construction and analysis of final income, which offers a more

complete picture of household income. Final household income can then be contrasted with other measures of income or units of analysis (such as individual income) as all data are gathered at the same time using the same methodology. This facilitates a richer analysis of distributional trends than would otherwise be possible.

That said, there are also some limitations in using HES data.

- As with other long running income surveys (such as the SIH), there have been changes that affect the consistency of the data. Over time, the ABS has improved its methodology, providing estimates of income items that are closer to their conceptual definition (box 1.1). While such changes improve the quality of data over time, it does mean that data across various surveys are not exactly the same. This increases the uncertainty of inferences about trends over periods where the definitional changes occur. However, in general, these effects appear to be relatively small (appendix B). Changes in survey design over time are discussed in more detail in appendix B.
- The HES is collected infrequently compared to the SIH (every two years) and HILDA (collected every year from 2001). This makes it difficult to identify key 'turning points' in trending data. It also means that any trends identified will be influenced by unusual factors affecting data at the start and end points of series (though this problem affects all time series analysis). Nevertheless, summary indicators derived from the HES appear to display trends consistent with those in the more frequent SIH and HILDA data.
- Information on individuals and households in the lowest income deciles is subject to some degree of ambiguity as many report expenditures greater than incomes and, on average, greater than those in higher incomes. This is also true of the SIH.
- Incomes for the top 1 per cent of earners are likely to be less accurate due to lower survey response rates amongst this group which are not accounted for in sample weighting procedures.
- The treatment of compulsory superannuation payments is likely to complicate changes in employee earnings between 1988-89 and 2009-10. As per international convention, superannuation is treated as income when it is drawn upon and treated as such by individuals. Superannuation reforms have taken place during the period examined by this study which would influenced labour incomes and therefore the distribution of income.

It should also be noted that research making use of HILDA data has found differing patterns in income inequality compared to research making use of ABS data (see Wilkins 2013). As discussed in appendix B, survey design and sample size are

likely to account for some of these differences, but further work is required to reconcile the differences found.

Nevertheless, the HES remains a valuable information source for developing a better understanding of the distribution of income in Australia, particularly when complemented with analysis based on other surveys. Where possible, estimates derived from the HES have also been checked against estimates in alternative ABS series.

Box 1.1 **Summary of recent changes to income measurement in HES**

- 2003-04
- Change in measurement of current income from own unincorporated business and investments from reported income for the previous financial year to respondents' estimates of expected income in the current financial year.
- Inclusion in employment income of all salary sacrificed income and non-cash benefits received from employers.
- Collection of a more detailed range of income items and information on all assets and liabilities of respondents.

2009-10

- Questions added to the survey on the amount of 'additional' overtime respondents expect to earn in the given year (in addition to 'usual' overtime).
- Netting off of interest paid from interest earned on borrowed funds to purchase shares or units in trusts. Previously only gross interest earned was recorded for investments other than rental properties.
- Inclusion of termination payments and workers' compensation lump sums, with an upper boundary of three months wages.
- Inclusion of irregular bonuses in employment income (in addition to regular bonuses).
- Expansion of family financial support from regular cash payments, mainly child and spousal support, to also include other forms of financial support including goods, services, rent, education (capital transfers, e.g. cars, remain excluded).

Source: Appendix B.

Representing the distribution of income

Income distributions are generally skewed to the right. That is, the mean or average income is greater than the mode (the most commonly occurring level of income). This skewing of the distribution of income tends to be greater for individual income than for household income as household formation exerts an equalising force. The same measures of the distribution of income can be applied to individual and

household income. Such measures seek to provide information on the shape of the distribution of income (whether wage, market, gross or final) for the population of interest (workers, individuals or households).

There are a range of different measures of the distribution of income. Some focus on the income share for specific groups — such as the proportion of income held by the top decile (or percentile) of the population. Others focus on characteristics of the distribution or seek to estimate the distribution itself — as with estimates of the probability density function of income obtained from kernel density estimation methods (box 1.2).

Box 1.2 **Kernel density estimation**

There are several methods that can be used to depict the distribution of income, ranging from histograms (frequency counts within defined income ranges) to attempts to estimate the shape of the distribution itself via kernel density estimation.

Kernel density estimation can be used to estimate the probability density function of a random variable, such as income (which is observed randomly within income surveys). It is a non-parametric approach that estimates the shape of the distribution by calculating the relative density of the number of observations for any given value of the variable of interest. Density estimates are produced using a similar method to histograms, with the exception that intervals are allowed to overlap. In this way estimates are produced by collecting 'centre point densities' through 'sliding' the interval, or window, across the data range.

The estimated functions allow the income distribution to be presented graphically, providing one lens through which to view changes over time. It remains important that other aspects of the distribution are also explored (including its moments: mean, median, mode amongst others) to understand the nature of the shifts observed.

Kernel density functions have the advantage over histograms in that they can be estimated as continuous smooth functions (histograms provide estimates over discrete ranges). For this study, kernel density estimation has been done in Stata using the Epanechnikov kernel function. Density estimates obtained have been converted to population proportions.

Source: StataCorp (2009).

Commonly used summary measures include those which examine income shares or ratios. Share measures include the share of income (or average income) of those within intervals defined by the share of the population — deciles (groups making up 10 per cent of the population), quintiles (20 per cent), and quartiles (25 per cent) are the most common.

The income estimate at any given percentile represents the value of income below which that per cent of incomes fall. For example, the income value at the 50th percentile means that 50 per cent of people earn less than that income (the 50th percentile is the same as the median income). Income at the 90th percentile means that 90 per cent of the population earn less than that amount.

The availability of income data from taxation records has allowed income shares to be used to examine historical changes in the distribution of individual incomes over long time periods (see, for example, Atkinson, Piketty and Saez 2011). This provides only a limited picture of trends in the distribution of income. The data needed to measure the characteristics of household income distributions are more detailed and is usually collected through household surveys. Improvements in data collection and availability have supported the more thorough examination of trends in the distribution of household equivalised income in the recent literature (for example Johnston and Wilkins 2006, Pavcnik 2011, Bray 2012, and Wilkins 2013).

Measures of inequality

Much of the analysis on income distributions focuses on the *dispersion* of the distribution (the second moment of the distribution). That is, the spread of income between those at the bottom and those at the top. Such measures, usually called measures of inequality, summarise the spread of incomes across the entire population (unlike percentile or decile measures which present point estimates).

There are several widely used measures of inequality, the most common being the Gini coefficient and the standard deviation of log income. Other measures capture particular aspects of the distribution such as percentile or decile ratios. Commonly used ratios include the 90th to 10th percentile ('P90:P10 ratio'), the P90:P50 ratio and the P50:P10 ratio. These measures are particularly useful for data sets where high and low incomes are coded or where issues of under reporting exist. (The HES does not include coded income data and with a large data set, along with the ABS's quality assurance processes, misreporting error is minimised as much as possible.) However, such measures focus on the percentiles (or deciles) examined and therefore do not reflect information about the spread of incomes that occur elsewhere in the distribution.

Ideally, inequality measures are designed to conform to a set of axioms to avoid measures that can behave in perverse ways (box 1.3). For example, measuring dispersion by the variance of the distribution is not independent of income scale, meaning a doubling of all incomes leads to a quadrupling of measured inequality.

Box 1.3 **Five key properties of inequality measures**

- The Pigou-Dalton transfer principle — any measure of inequality must, in response to a mean preserving redistribution, rise (or at least not fall) for an income transfer from a lower income to a higher income person and fall (or at least not rise) for a counter transfer (Pigou 1912; Dalton 1920).
- Income scale independence — any measure of inequality should be invariant to uniform proportional changes in income. That is, if each individual's income changes by the same proportion then measured inequality should not change.
- Principle population — any measure of inequality should be invariant to replications of the population. If two identical income distributions are merged, measured inequality should not change.
- Anonymity — the inequality measure should be independent of any characteristic of individuals other than their income (or the indicator whose distribution is being measured). For example, measured inequality in an economy with two individuals, A and B, whose income shares are 60 and 40 per cent respectively should be invariant if the income shares are swapped.
- Decomposability — overall measured inequality should be related consistently to constituent parts of the distribution. That is, if inequality increases amongst all sub-groups of the population then overall inequality would also be expected to increase.

Source: Litchfield (1999).

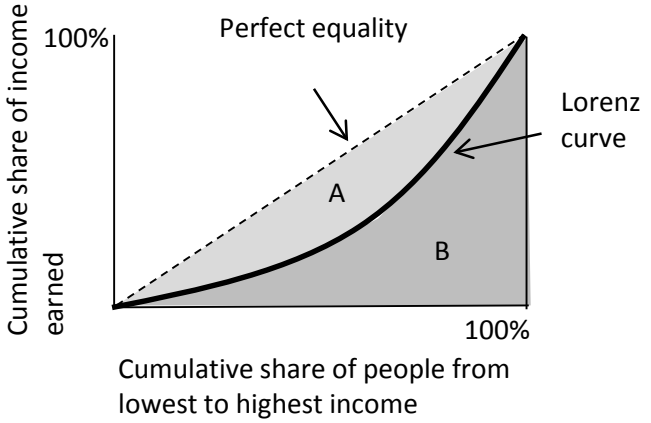
Much of the literature concerning income inequality focuses on the Gini coefficient (see box 1.4 and appendix A). In short, this measure depicts the difference in the observed income distribution to one in which income is equally distributed. This measure satisfies the axioms of inequality measures but is not without its limitations. First, there is not an unambiguous interpretation of changes in the Gini (see following section). Second, the Gini is only decomposable if the partitions of a distribution are non-overlapping (Litchfield 1999) — that is, if the income distributions of the sub-group populations for which the decomposition is sought do not overlap. For example, the Gini coefficient would only be decomposable between the effect of part-time and full-time earners if the maximum income from part-time workers does not exceed the minimum earnings of full-time workers. If this is not the case, some of the variation in the Gini coefficient cannot be attributed to a particular sub-group as it will be correlated to both.

This paper does not seek to advance the large volume of literature that surrounds the measurement of the dispersion of income. Instead, a 'practitioners approach' is taken, which focuses on graphical depictions of distributional change using probability density functions, decile analysis and the commonly used Gini coefficient as the summary measure of inequality.

Box 1.4 **The Gini coefficient**

The Gini coefficient can be graphically represented using the Lorenz curve, which depicts the cumulative income shares against cumulative population shares (see example in figure below). The curvature of the Lorenz curve depicts the level of inequality. If all individuals (or households) had the same income (perfect equality), then the curve would lie along a 45 degree ray from the origin.

The Gini coefficient is the ratio of the area enclosed by the Lorenz curve and the perfect equality line (A) to the total area below that line (A+B). It ranges from 0 (perfect equality, A=0) to 1 (perfect inequality B=0).



Source: Jenkins and Van Kerm (2008).

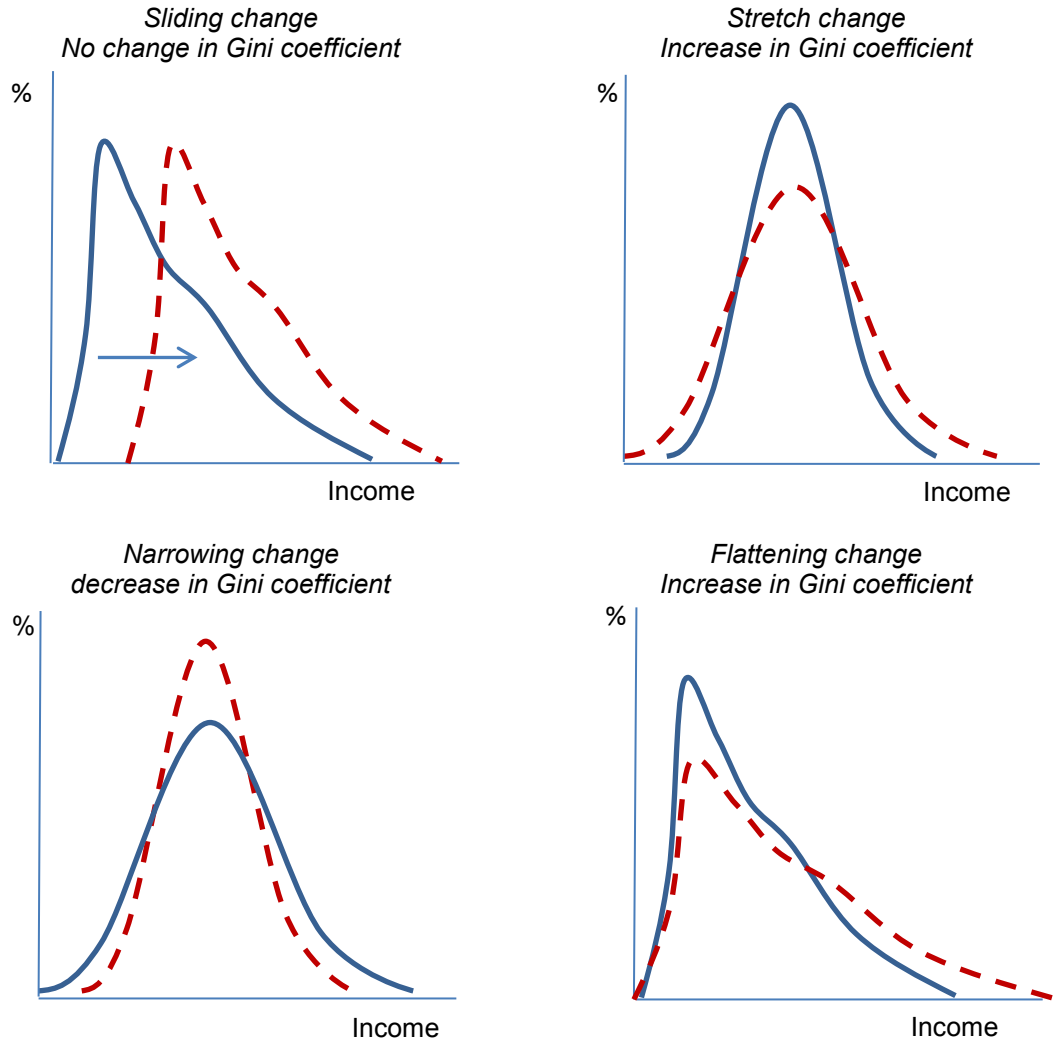
Measures of inequality and distributional changes

The link between distributional shifts observed in probability density functions and summary measures of income inequality such as the Gini coefficient is not straightforward. Distributional shifts can be characterised into four components:

- sliding — a ceteris paribus shift to the right or left along the income line
- stretching — a ceteris paribus increase in spread around a constant mean
- narrowing — a ceteris paribus decrease in spread around a constant mean
- flattening — a ceteris paribus disproportionate increase in density (or proportion or the population) on one side of the mode (Jenkins and Van Kerm 2004).

A ceteris paribus (rightward) sliding of a distribution along an income line (figure 1.2, top left panel) represents a situation where incomes of all individuals within a population have increased. In this instance, the Gini coefficient will remain unchanged as the spread of incomes across the population has also remained unchanged.

Figure 1.2 **Types of distribution change and changes in Gini coefficient**



A ceteris paribus stretching of a distribution will occur in instances of growing tails (figure 1.2, top right panel). Both the proportion of individuals on low incomes increases, and the proportion of individuals with high incomes increases (or upper point increases). In this instance, the spread of incomes has increased and the Gini coefficient will also increase. A ceteris paribus narrowing of the distribution is the reverse of this and will decrease the Gini coefficient (figure 1.2, bottom left panel).

A ceteris paribus flattening of the distribution is the most complex change and can take several forms. It can occur with a shift in the proportion of the population from the left side of the mode to the right, where these individuals become dispersed across the income ranges on the right of the mode (as depicted in figure 1.2, bottom right panel). Such a shift will increase the Gini coefficient even where the highest observed income remains unchanged.

Even more complex than links between probability density functions and the Gini coefficient are those between these measures and changes in social welfare (box 1.5). It should be noted that any specific Gini value is neither 'good' nor 'bad' in the sense that a different Gini result would be welfare enhancing.[3] Instead, it represents a measure of the dispersion of the distribution of income and, if viewed over time, provides a way to summarise changes in income dispersion.

Box 1.5 **Distributional shifts, the Gini coefficient and welfare**

The four stylised distributional changes — sliding, stretching, narrowing and flattening can, in part, be related to assessments of social welfare.

Assuming that assessments are based on a social welfare function that satisfies the property of monotonicity — that is, more income is better than less regardless of relative income — then a sliding to the right of an income distribution implies an increase in welfare (no change, all else remaining equal, in the Gini coefficient). In other words, real increases in incomes for all means the population is better off than before.

Further, assuming a social welfare function that is increasing and S-concave in income — that is, where higher incomes increase welfare but the welfare improvement of an additional dollar of income for those with initially high income is less than the impact on those with initially low incomes — a stretching of the distribution (increase in Gini) implies a decrease in social welfare. A narrowing confers the opposite.

The social welfare implications for a flattening or squashing of the distribution are less clear. In essence, a flattening or squashing of the distribution is likely to be driven by changes in the skewness and kurtosis in the distribution. Jenkins and Van Kerm (2004) show these effects are generally driven by changes in sub-groups which should be evaluated independently.

This highlights that for some welfare-enhancing changes, the Gini coefficient remains unchanged or could even increase. Further, it is likely that changes in a distribution over time incorporate most of these facets. Given these considerations, welfare inferences from changes in aggregate Gini coefficient estimates are not possible.

Source: Jenkins and Van Kerm (2004).

3 For example, two societies with the same Gini coefficients can have very different distributions of income. Consider a hypothetical country (country A) in which 50 per cent of the population receives all the income earned in equal amounts (that is, total income is distributed equally amongst 50 per cent of the population. The Gini coefficient for country A would be 0.5. Another country (country B) where 25 per cent of all income is earned equally by 75 per cent of the population with the remaining income earned by 25 per cent of the population would also have the same Gini coefficient — 0.5. Despite having the same Gini coefficient, these countries have very different underlying income distributions.

To address the question of whether welfare is affected by a change in the distribution of income, the underlying factors determining the distribution and reasons behind observed changes must be understood. Social welfare must also take into account the effects of non-market changes associated with changes in measured income. The importance to the individuals in the population of their relative income position and attitudes to inequality must also be known.[4] Such questions are beyond the scope of this paper.

4 Research has indicated that not only do attitudes to both own relative position and inequality in general differ across countries, gender, age and cultural background (Austen 2002), they also change over time (Meagher and Wilson 2008).

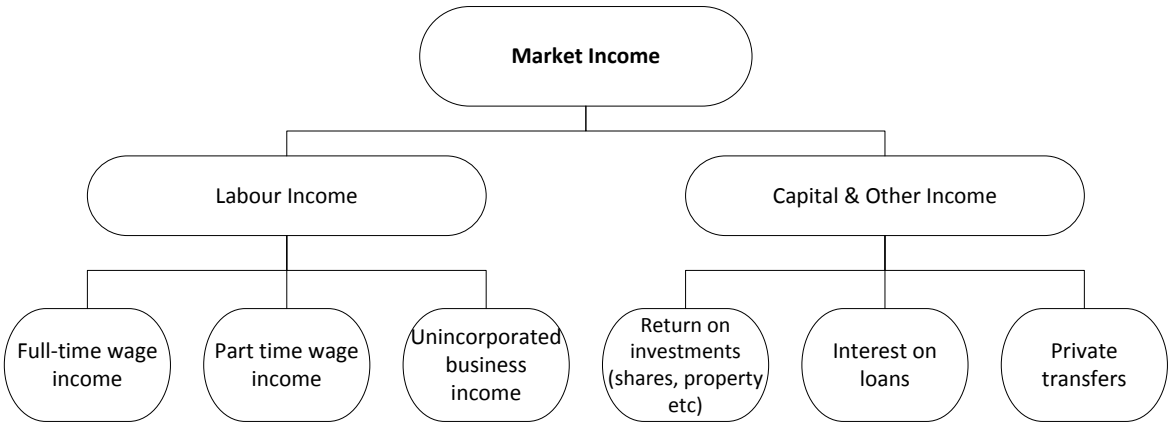
2 Individual income

Key points

- Average real labour incomes have grown substantially — from around $800 per week in 1988-89, to around $1100 per week in 2009-10 in 2011-12 dollar terms (a 38 per cent increase).
- While these economic gains have accrued to both high and low income groups:
  - income has grown faster among high earners (as a group) than low earners
  - the distribution of income has shifted to the right (a decline in the relative population of people on very low incomes) and has become flatter (greater diversity in earnings)
  - these changes have been associated with increases in measures of labour income inequality, such as the Gini coefficient (which has increased from 0.35 in 1988-89 to 0.41 in 2009-10 among employed people).
- In part, labour income inequality reflects differences between the average earnings of full-time, part-time and self-employed workers. These accounted for around half of measured inequality in labour income in 2009-10. The remainder is due to income differences that occur between people within each of these groups.
  - Income inequality is lowest among full-time workers and highest amongst the self-employed.
  - Between 1988-89 and 2009-10, indicators of labour income inequality rose steadily amongst full-time workers, were stable amongst part-time workers and were volatile among the self-employed.
- Employee earnings are determined by hours worked and hourly wages.
  - For full-time workers, real hourly wages have grown by around 23 per cent since 1998-99 while hours worked have changed little. Hourly wages have grown faster for high income earners than for low income earners.
  - For part-time workers, both hourly wages and working hours have increased (around 8 per cent and 16 per cent, respectively), raising weekly earnings.
- Capital & other income is highly concentrated and has become more so over time. However, it is a small proportion of market income (around 11 per cent in 2009-10)
- The growth in the dispersion of hourly wages for full-time workers is the key driver of overall increases in measured inequality for both labour and market income.
  - The growth in the relative proportion of people employed part-time has played a lesser role.
- HES data suggest, that neither recent trends specific to the top 1 per cent of income earners, nor the gender-pay gap, explain the broader trends in measured individual income inequality.

For most people of working age, the money earned from paid employment (or self-employment) comprises their most important source of income. This is known as their labour earnings. It should be noted that current weekly incomes for some individuals who are self-employed (that is, they run their own unincorporated business) are negative. These result from individuals reporting a loss from their business. Income for this group will also include returns to capital invested in the business. Despite this, as no 'imputed wage' is available for unincorporated business owners, income from an own unincorporated business represents the best proxy for wages for the self-employed and has been used in this study. Capital & other income (such as rents or returns from investment and private transfers) also represent an important source of income for some people. Together, these income sources comprise an individual's overall market income (figure 2.1), which is a determinant of where they sit in the overall distribution of income (additional determinants such as taxes, transfers and household formation are discussed in chapter 3). This chapter identifies how engagement with labour and capital markets has shaped Australian market income over the last 20 years — how the distribution of market income has changed and how developments among sub-groups have driven broader trends.

Figure 2.1 **Sources of individual market income**



This chapter does not attempt to identify causal factors or estimate their contribution to observed distributional changes.[1] Rather, the focus is on providing a richer description of the distribution of income generally and, in particular, the distributional changes that have affected summary measures of inequality. The chapter proceeds as follows.

[1] See Gaston and Rajaguru (2009) for a recent analysis of the causal factors underlying distributional changes in Australia.

- Changes in labour force income are presented for those in paid employment. Particular attention is paid to the contribution of employment status, hours worked and hourly wage rates (section 2.1).
- Capital income is examined in terms of how its relative size and dispersion has changed over the last 20 years (section 2.2).
- The distributional ramifications of very high income earners and the gender pay gap are also considered (section 2.3).

2.1 Trends in labour income

Labour income has grown

Over the last 20 years, average real labour incomes have increased substantially in Australia for full-time, part-time, and self-employed workers (by 50 per cent, 47 per cent and 53 per cent respectively).[2] Overall, average labour income has increased from around $800 per week in 1988-89 to $1100 per week in 2009-10, that is 38 per cent (figure 2.2).[3]

The time path of income growth has varied by worker category. Full-time workers have experienced real income growth between each of the periods examined, with growth being particularly strong since 2003-04. Both part-time workers and the self-employed, however, experienced a decline in average earnings between 1988-89 and 1993-94, but an increase in each subsequent period. The difference may reflect how changes in general economic conditions affected different worker types (the 1993-94 HES was conducted in the aftermath of a recession in Australia).[4]

The growth in the incomes each of the worker sub-groups (full-time, part-time and self-employed) exceeded that seen in for all workers due to differences in the

2 All figures in this section refer to HES respondents who report non-zero labour income over the period.

3 Whilst not directly comparable due to differences in scope and coverage, these estimates are similar to those derived from ABS 6302.0. In 2011-12 dollars, this survey suggests average weekly earnings of all employees grew from $802 in February 1989 to $1014 in 2009-10.

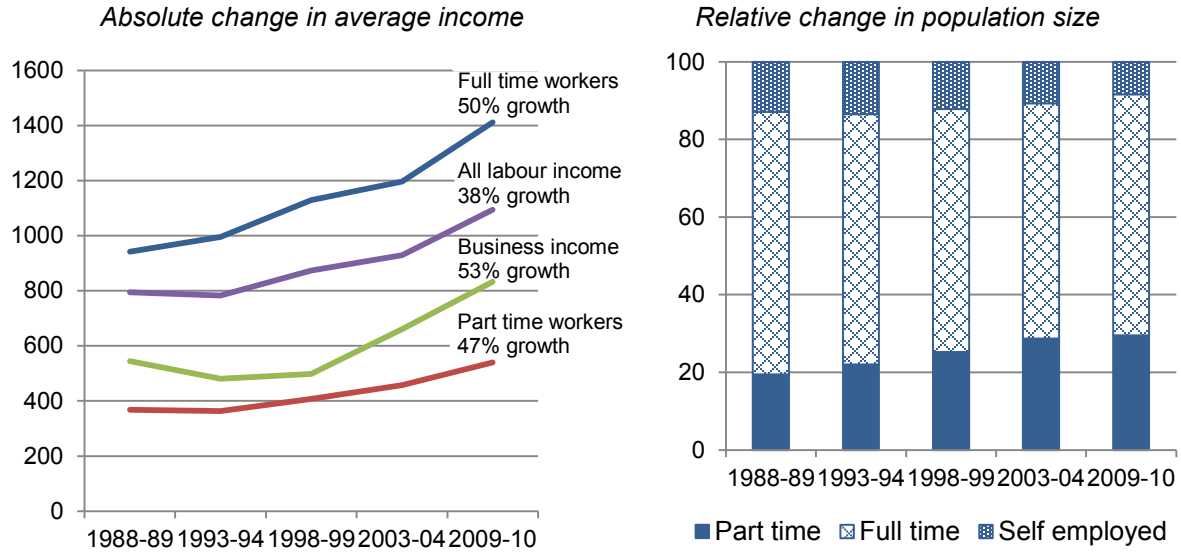
4 For example, if full-time workers wages are 'sticky' (in the sense that nominal hourly wages cannot easily decline in response to periods of lowered labour demand (Hall 2005)) then in recessionary periods (that are not too prolonged) full-time time workers will tend to maintain their earnings or exit full-time employment (through unemployment or becoming part-time). On the other hand, the earnings of part-time workers and the self-employed may be more flexible. Part-time workers can have their hours scaled back, while a deterioration in the business environment directly impacts the earnings of the self-employed.

relative growth in the size of each populations sub-groups. The number of part-time workers (who as a group have the lowest average income) has increased at a faster rate (by 136 per cent, from 1.3 million to 3.1 million workers) than full-time workers (up 43 per cent, from 4.6 million to 6.6 million workers). The increase in population share of this 'low income' group in total workers moderated the growth of labour income when all employees are considered.

Despite the growth in their average income, the number of self-employed (with no other job) declined in relative terms although the absolute numbers remain relatively stable over the period (from 880 000 in 1988-89 to 886 000 in 2009-10).

Figure 2.2 **Change in average weekly income and relative size of employment types, 1988-89 to 2009-10**

Real 2011-12 dollars (left side graph) and percentage (right side graph)



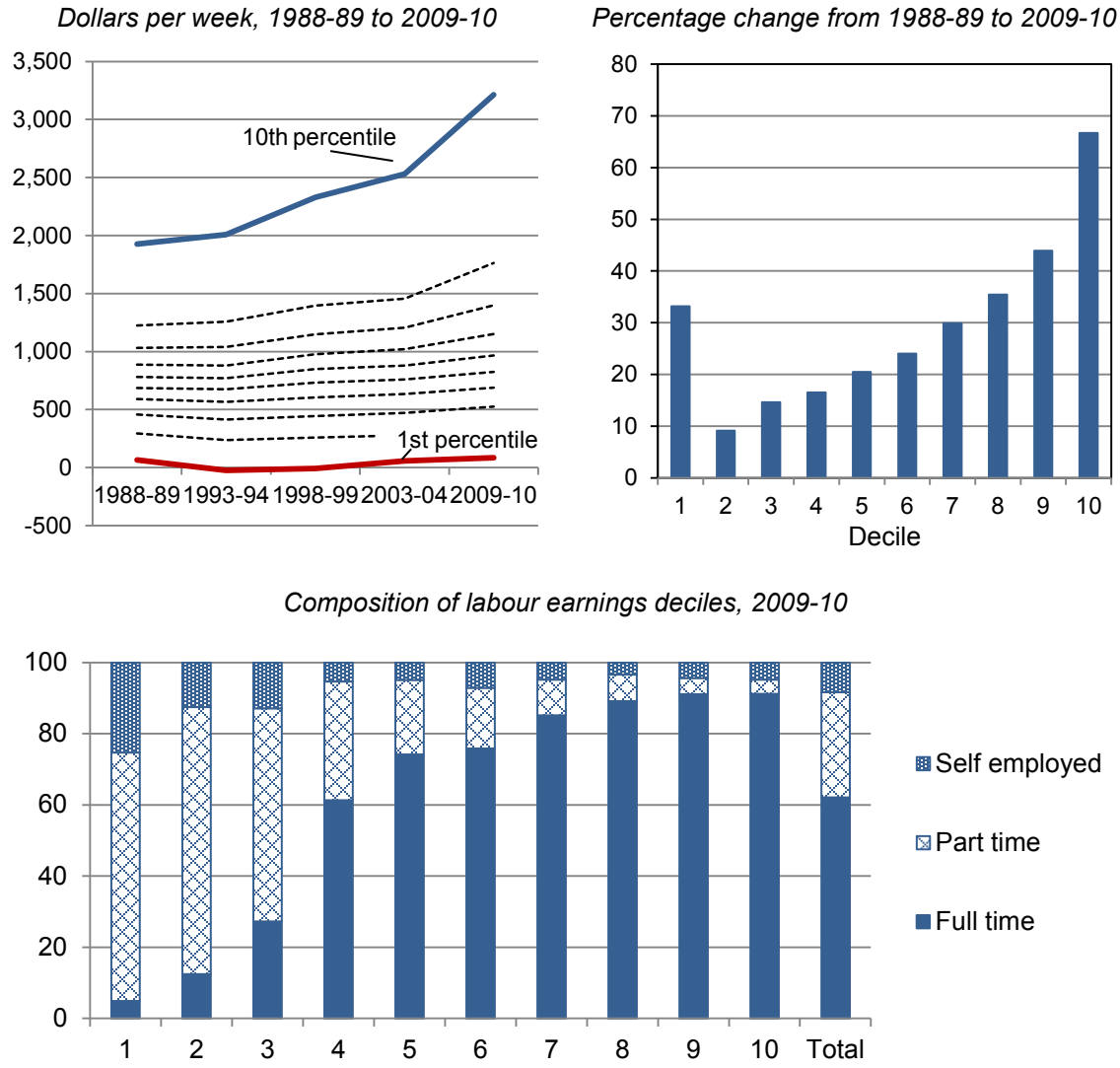
Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Labour income has grown across the distribution, but more at the top than the bottom

Overall, changes in average income can be unpacked by partitioning the income distribution into deciles and comparing how they have changed over time (figure 2.3, top panels). This shows that higher income groups have experienced higher average income growth than all cases except for the bottom decile.

Figure 2.3 **Average weekly labour earnings by labour income decile and decile composition by worker type**

Real 2011-12 dollars (top left) and percentage change (top right and bottom)



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Examining the income deciles of sub-groups,[5] the broad patterns in figure 2.3 are mirrored in the increased dispersion of earnings amongst full-time workers and the self-employed (figure 2.4). In contrast, average income growth has been more evenly spread among part-time workers, with stronger growth in the bottom three deciles. The bottom three deciles of part-time workers dominate the bottom decile of overall labour earnings. High income growth amongst this latter group drives the spike in income growth observed in the first decile of overall labour income (figure

5 Deciles were separately constructed for full-time, part-time and the self-employed earnings.

2.3, top right panel). The roles of hours worked and hourly wages in driving these trends in weekly income are discussed later in this chapter.

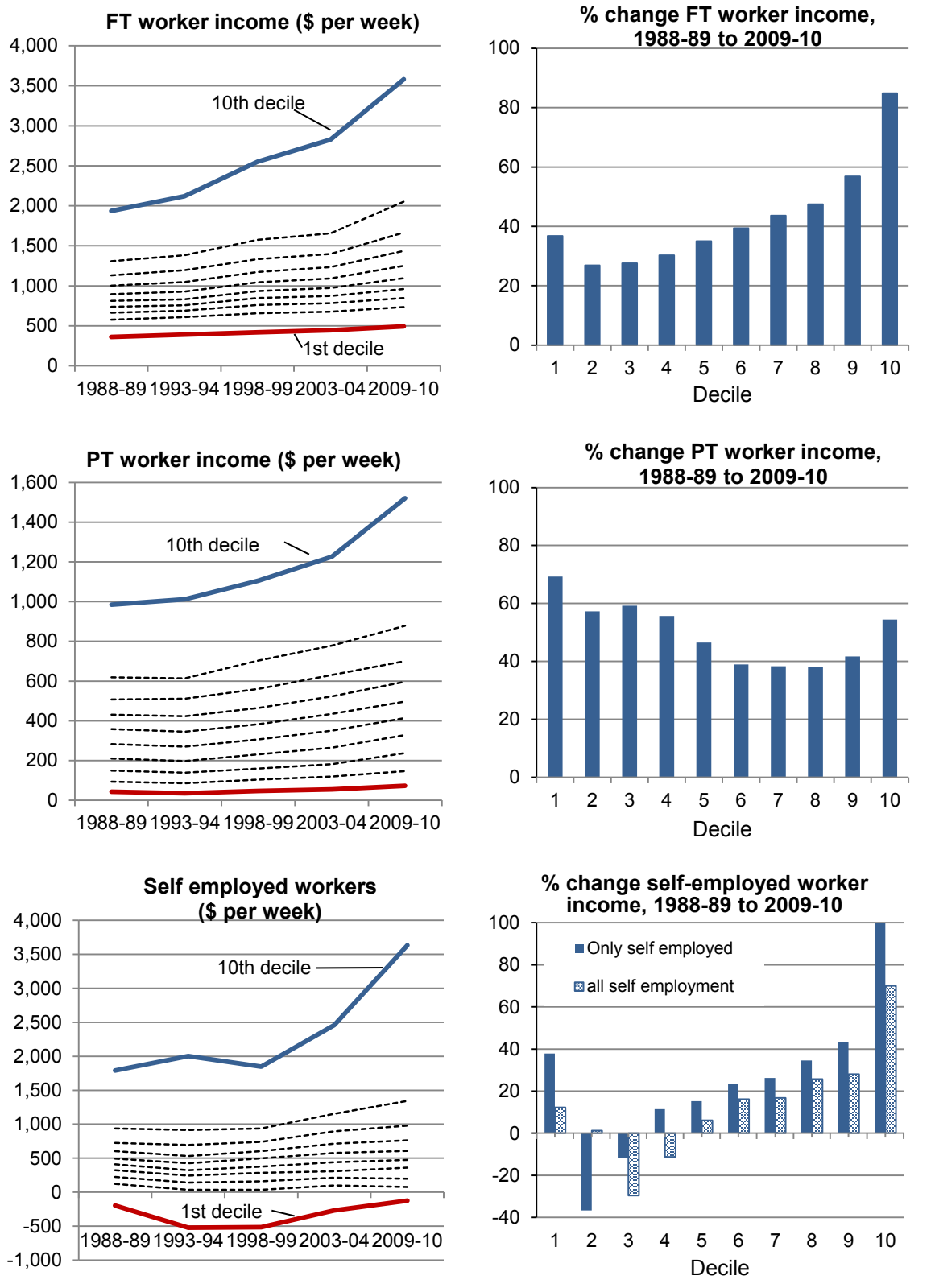
The earnings profile of the self-employed is the most complex and contains a number of distinguishing features.

- *Many self-employed are also salaried employees.* In 2009-10, around 19 per cent of people who were self-employed and earned income from their business had either a part-time (7.4 per cent) or a full-time (11.5 per cent) job. In part, this explains the greater level of dispersion in business income (discussed below), as these people are effectively splitting their labour effort their reported business income is lower than their actual labour income. Self-employed workers who rely totally on their business for their labour income earn significantly more business income than 'mixed-workers' and have experienced greater income growth in the last 20 years (figure 2.4, bottom right panel). The same effect is also present in the reported income of full-time and part-time workers (those who also have a small business earn less on average). However, as mixed-income workers are a much smaller proportion of full-time and part-time workers, their presence has little effect on the observed averages of these groups.
- *There are always some businesses losing money*. The first decile of the self-employed has reported substantial negative earnings over the last 20 years (for those with no other salaried job, average weekly losses changed from almost $200 per week in 1988-89 to around $123 in 2009-10). As the HES draws a random sample in each period, this is not suggestive of a stable cohort of loss making businesses. By necessity, the loss making group is likely to largely reflect businesses undergoing some type of transition. For example, businesses making a loss during a start-up or expansionary phase; going through a temporary 'bad spell'; or on a path to bankruptcy and dissolution. These factors will also influence returns to those in the second and third deciles.
- *Business is risky but the potential rewards are larger.* Self-employed workers have the most volatile income series through time, as well as the largest 'gap' between high and low deciles, in both absolute and relative terms. For example, the 10th decile of full-time workers earns around three and a half times as much as the 2nd decile. For the self-employed (with no other salaried job) the ratio is around 46 times.[6] Indeed, the top decile of self-employed experienced greater growth over the period than any type of worker, and in 2009-10 earned more than any other type of worker.

6 The ratio of the 2nd decile to the 10th is used here as the 1st decile of the self-employed has a negative income on average.

Figure 2.4 **Change in average weekly earnings by worker type and decile**

Real 2011-12 dollars (left side) and percentage change (right side)



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

The distribution of labour income is shifting to the right and becoming flatter

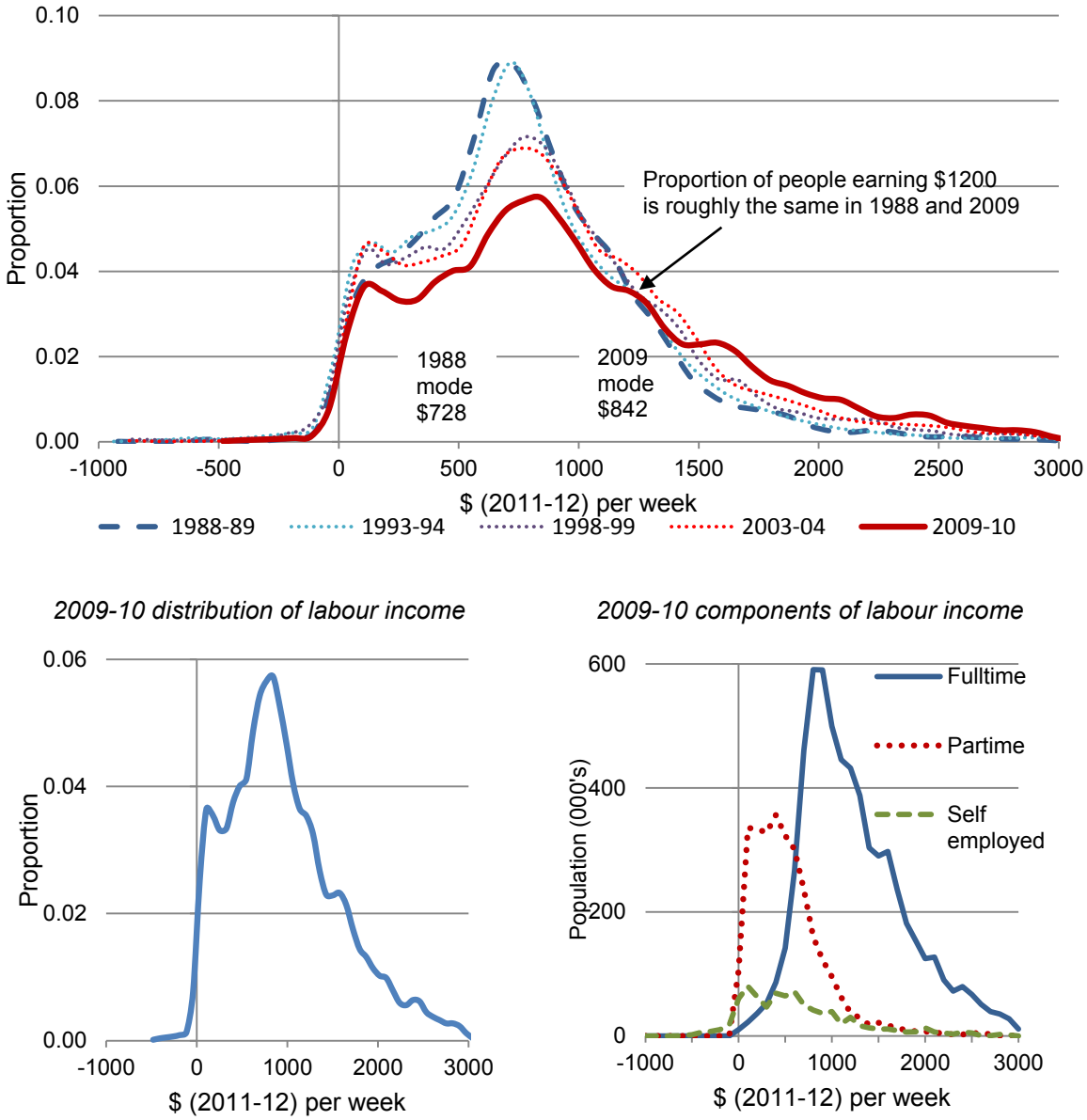
While decile analysis provides insight into distribution changes (in terms of partitioned income groups), it is useful to consider the distribution of income as a whole in order to garner a more complete understanding of how it moves over time. This is commonly done through the estimation of Probability Density Functions (chapter 1), which are particularly useful in describing where populations tend to be *located* in terms of their real labour earnings, and how these loci shift over time.

For all periods, except 1988-89, the distribution of labour earnings is double peaked. This is due to the underlying size and shape of the distributions of full-time, part-time, and self-employed workers (that combine to form labour earnings). The lower portion (below the median) of the distribution of labour earnings is dominated by part-time workers and the self-employed, forming the first peak (figure 2.5, bottom right panel). The upper portion (roughly the full-time minimum wage upwards) is dominated by full-time workers.

Over time, the distribution of labour earnings has flattened and shifted to the right.

- *The rightward shift in the distribution indicates that the proportion of Australians on 'lower' real labour incomes (in absolute terms) has declined and the proportion of Australians on 'higher' real labour incomes has increased*. The lower tail of the labour income distribution has fallen for all values below $1200 per week since 1988-89 (meaning the relative share of the population in this range has declined), while the distribution has risen beyond this (meaning the relative population earning more than $1200 has grown). Put differently, if you were randomly to meet an individual in 1988-89, then another in 2009-10, the probability of the second person earning less than $1200 per week would be lower (and the probability of them earning more higher).
- *The flattening of the distribution indicates a greater spread of labour earnings*. The higher, thinner, peak observed in 1988-89 indicates a greater concentration of labour earnings – that is, there were more people with similar labour earnings in 1988-89 than there were in 2009-10. The spreading out of income is also evident in changes in the most frequently observed income level (the modal income). In 1988-89, around 9 per cent of people earned around $728 (the most frequently observed value). In 2009-10, the most frequently observed value of labour earnings had increased to $842 – but only 6 per cent of the population earned this amount. Put differently, 100 randomly met people in 2009-10 would tend to yield a greater variety of incomes than 100 randomly met people in 1988-89.

Figure 2.5 **Change in the distribution of labour income, 1988-89 to 2009-10**



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Compared to overall labour earnings, the income distribution for full-time workers is thinner, single peaked and closer to a 'normal distribution'.[7] Nevertheless, it exhibits the same basic pattern as overall labour earnings (that is, a relative decline in the population of low income earners, an increase in the population of high income earners and a flattening of the distribution). Changes in the upper half of the labour earnings distribution are almost entirely due to changes in the earnings of

[7] That is, singled peaked with a single value for the mode, median and mean.

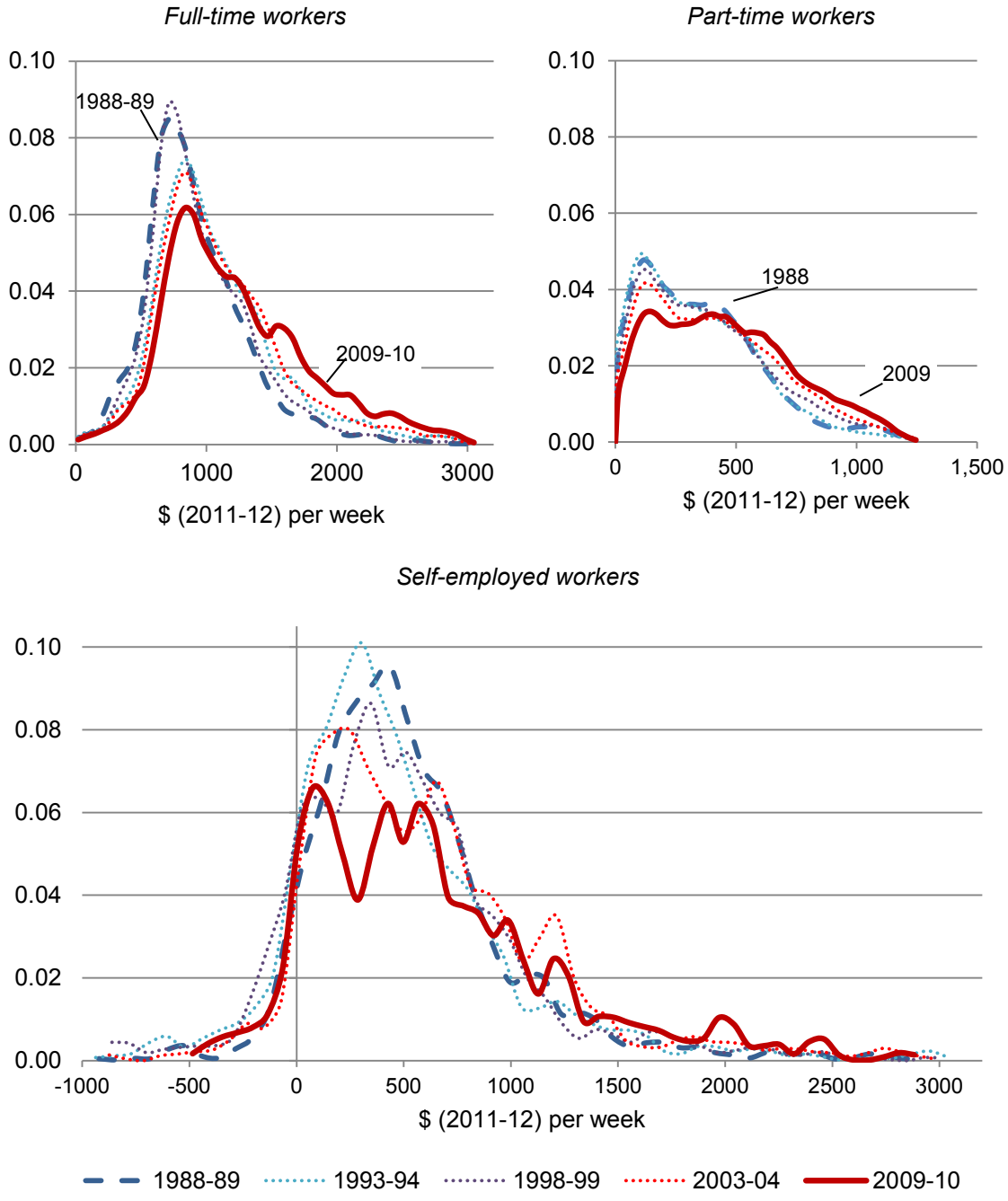
full-time workers, who form the majority of this group (figure 2.5, bottom right panel).

The income distribution for part-time workers also shows a clear pattern of a declining proportion of those on lower incomes (in this case below $500 per week) and an increasing proportion of workers earning higher wages. The absolute number of part-time workers has increased at all income levels, however growth has been higher amongst those earning more than $500 per week — meaning they now account for a relatively higher proportion of the total. In the absence of this growth in part-time workers (earning lower average wages than full-time workers), the rightward shift of overall labour earnings would have been even more pronounced (figure 2.5, top panel).

Changes in the distribution of earnings of the self-employed have several features that are not easily interpreted. First, the distribution tends to 'bounce' from period to period (as opposed to the smoother transitions observed in employee earnings), suggestive of either more distributive volatility, more measurement error or both — in particular, self-employed earnings are more likely to be influenced by changes in survey income concepts over time — see chapter 1 and appendix B. Second, the earnings profile has grown flatter over the whole period (suggesting more varied earnings), but, unlike employee earnings, this has also been accompanied by growth in the proportion of those in the lowest income ranges (in this case between losses of $500 per week and earnings of $76 dollars per week). The proportion of high income earners (above $900 per week) has also increased. Third, the distribution of income from self-employment also appears double peaked in 2009-10 — though it is not clear why. These features may reflect behavioural characteristics of the self-employed, difficulties in measuring their earnings, and/or variability due to the relatively small sample of this population.

Figure 2.6 **Change in the distribution of income by worker type, 1988-89 to 2009-10**

Proportion of workers



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

How have distributional changes affected measured inequality?

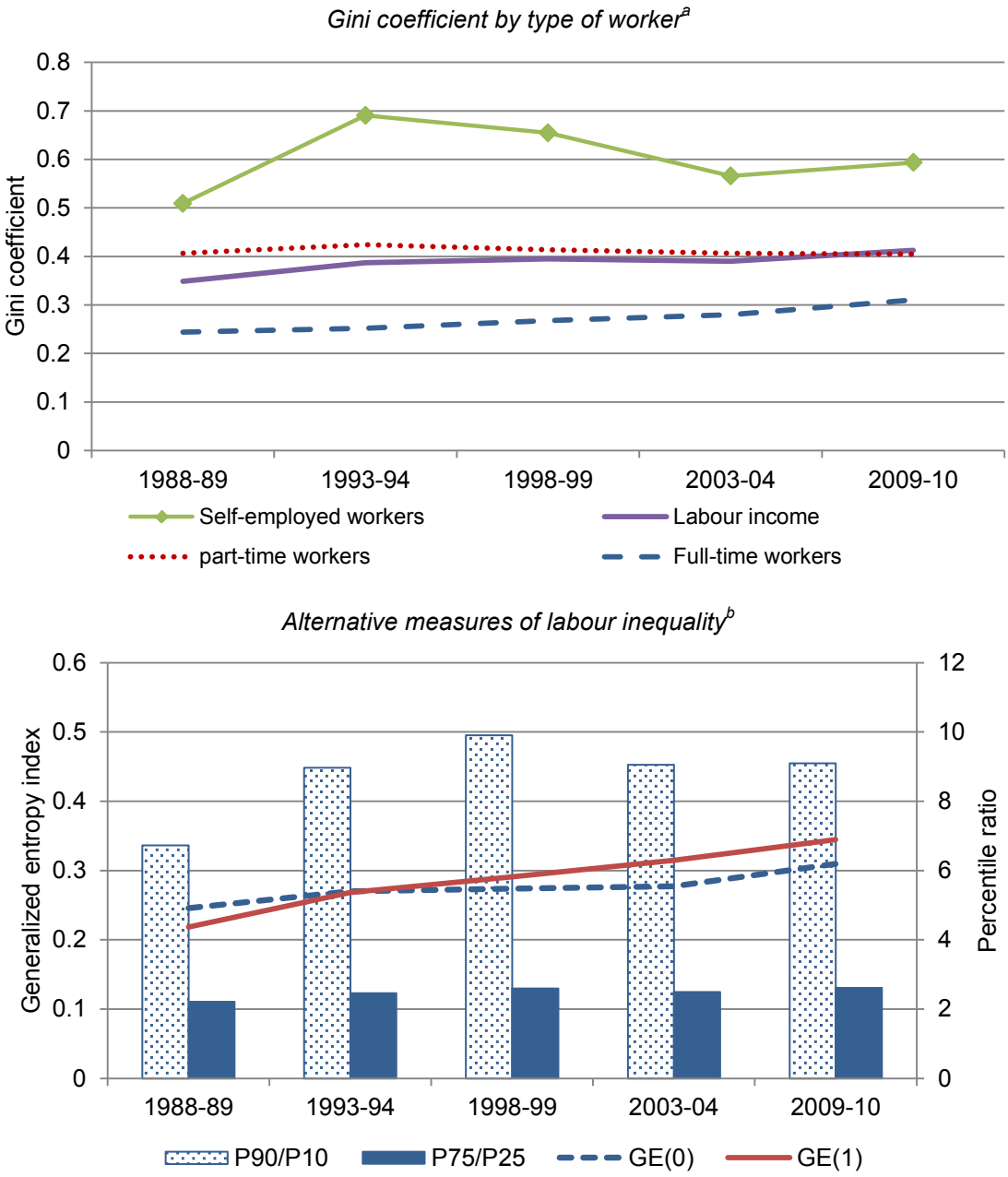
Gini coefficients (appendix A) are the most common summary statistic of inequality. Full-time workers — the largest group — have the most equal distribution of income with a Gini coefficient of 0.31 in 2009-10 (figure 2.7, top panel). This is followed by part-time workers (0.40), while the self-employed (0.59) have a Gini coefficient almost twice as high as full-time workers. The Gini coefficient for labour income is effectively a weighted average of the results for each sub-group (influenced by the differences in average sub-group income, the dispersion of income within sub-groups, as well as their relative size).

This measure of income inequality has trended upwards since 1988-89 for all types of workers except part-time workers, for which the Gini coefficient has remained relatively stable (and indeed exhibits a slight downward trend since 1993-94). Nevertheless, part-time workers have influenced the upward trend in inequality of labour earnings, due to their increasing share of the workforce (discussed below). Over the period covered labour earnings inequality has increased, with the Gini-coefficient rising from around 0.35 in 1988-89 to around 0.41 in 2009-10 (an increase of around 18 per cent).

While starting from a more equal distribution of income, full-time workers have exhibited the greatest growth in measured inequality since 1988, as well as the most consistent trend. In contrast, the self-employed displayed the most varied trajectory. Increases (decreases) in measured inequality among self-employed people appear to coincide with periods of growth (decline) in the aggregate number of self-employed.

Other summary measures of inequality (appendix A), including the ratio of the income of top of the 90^{th} percentile to the top of the 10^{th} percentile(P90/P10), the mean logarithmic deviation and the Theil index also indicate measured inequality in Australia has increased between 1988-89 and 2009-10 (figure 2.7, bottom panel). However, patterns in each measure within this period vary — in particular the P90/P10 and P75/P25 measures which initially rose but remained stable between 2003-04 and 2009-10.

Figure 2.7 **Changes in labour income inequality, 1988-89 to 2009-10**



a Increases in Gini coefficient over the whole period are statistically significant for all groups at the 1 per cent level. **b** GE(0) refers to the mean logarithmic deviation and the GE(1) refers to the Theil index.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Are the important differences 'within' or 'between' worker types?

Interpreting changes in summary measures such as the Gini coefficient is made more difficult due to the presence of different groups, each with different earning

profiles. Overall, changes in the Gini coefficient are affected by varying relativities *between* groups (for example, the higher average income growth of self-employed workers compared to part-time workers exerts an upward pressure on inequality). Overall changes are influenced by the level of income dispersion *within* each group (for example, inequality increased markedly amongst self-employed workers, exerting upward pressure on inequality). These effects are commonly referred to as the impact of 'between' variation and 'within' variation.

So which effect has been most important?

A commonly cited drawback of the Gini coefficient is that it usually cannot be fully decomposed (box 2.1). While the contribution of *within* and *between* variability can be estimated, a residual term (usually) remains, which contains both *within* and *between* effects and has no clear interpretation. This means that total contribution of *within* and *between* variability to the Gini coefficient cannot be exactly calculated. The greater the contribution of this 'overlapping' residual, the less informative the decomposition.

The decomposition analysis suggests that differences in the average incomes between worker types, and differences in individual incomes within each type, are roughly equal contributors to labour income inequality in Australia (figure 2.8).

The unexplained 'overlapping' residual is typically around 10 per cent. While relatively small, this residual obscures trends in the relative importance of the two types of variation. Nevertheless, the decomposition is suggestive of two features.

- Since 1993-94, the differences in the average incomes of full-time, part-time and self-employed workers have been more important in determining overall inequality than the variation in income of workers within each of these categories.
- However, the difference in the contribution of 'between' and 'within' variability to the Gini coefficient is small (at most 9 per cent in 1998-99) and has been declining over time. That is, variation in income of individuals within each group has grown in relative importance, while variation in average income between each group has declined in relative importance.

Box 2.1 **Decomposition of the Gini coefficient**

The most general decomposition of any inequality index *I* generates a *within* element and a *between* element.

$$I = I_{within} + I_{between}$$

The within element describes how the variation that occurs among members of a specified group contributes to inequality. The between element describes how the different average incomes of specified groups contributes to inequality.

In the simple case comparing two groups *A and B,* it can be shown that the within element of the Gini can be calculated as follows:

$$Gini_{Within} = \left(\frac{n_A}{n} \times \frac{Y_A}{Y}\right) \times G_A + \left(\frac{n_B}{n} \times \frac{Y_B}{Y}\right) \times G_B$$

where G_A and G_B are the Gini coefficients for each group, $\frac{n_A}{n}$ and $\frac{n_B}{n}$ are the population shares for each group and $\frac{Y_A}{Y}$ and $\frac{Y_B}{Y}$ are the income shares for each group.

The between element of the Gini coefficient can be calculated as follows

$$Gini_{Between} = \frac{2}{Y} \times Cov(\bar{Y}, F(\bar{Y}))$$

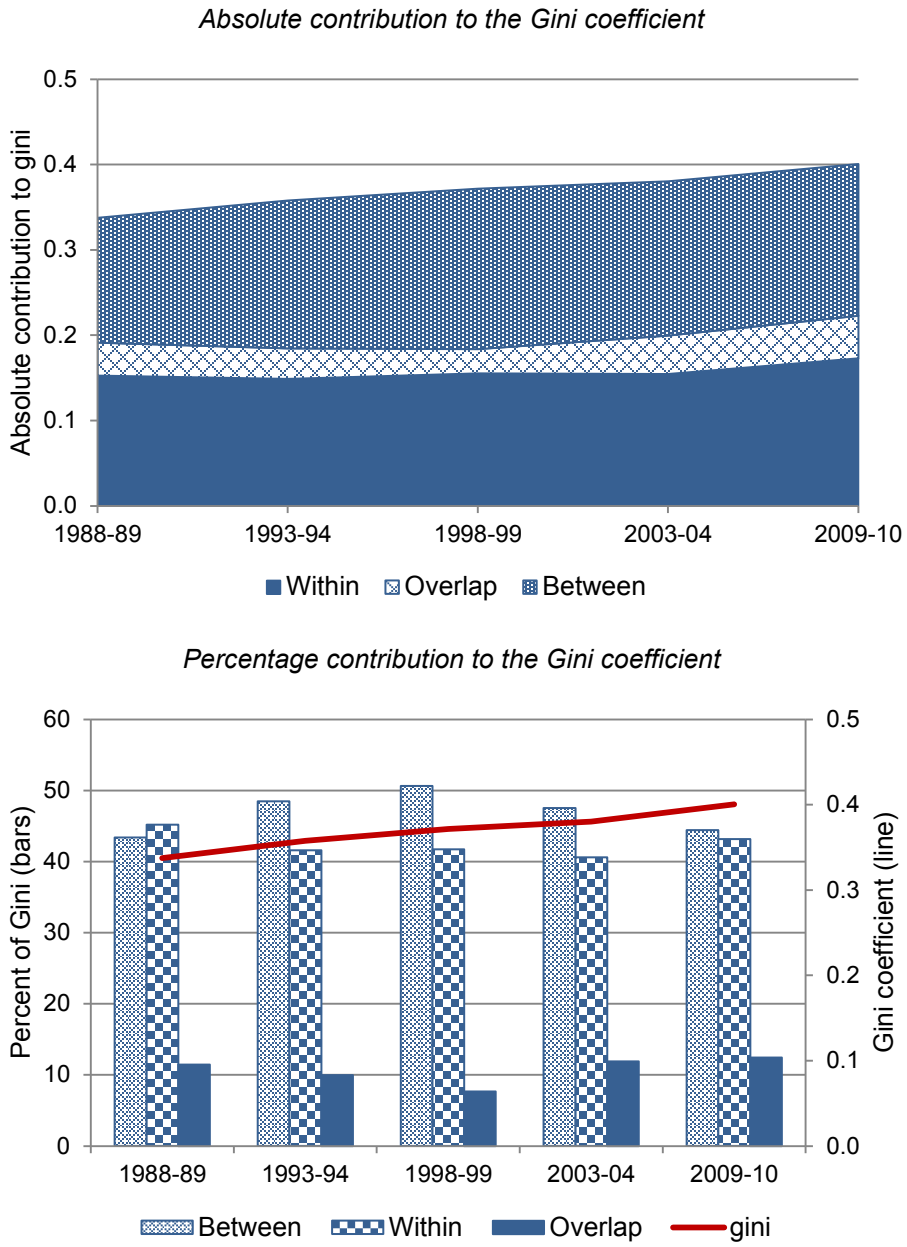
where $\bar{Y}$ is the distribution of income obtained by replacing actual incomes with sub-groups means. In this case, as the within group incomes are all equal (to the sub-group mean), the covariance term represents the dispersion of income attributable to differences between the mean income of the sub-groups.

In the (unusual) case where ranking by sub-group incomes from poorest to richest does not involve any overlap, then the Gini coefficient is perfectly decomposable as described above. However, in general, a residual exists that is essentially a mixed term, representing both within and between (that is, the sum of the within component and the between component is less than total inequality).

Sources: Rao (1969); Bourguignon (1979) and Bellu and Liberati (2006).

The following two sections examine in more detail how changes in the distribution of incomes have been influenced by underlying changes to worker groups in terms of their relative size, hours worked, and hourly wages.

Figure 2.8 **Contribution of 'within' and 'between' variation of worker type to the Gini coefficient, 1988-89 to 2009-10**



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

What effect has the growth of part-time work had on the Gini coefficient?

The increasing share of part-time workers is a key compositional shift in the labour force in Australia over the last 20 years (figure 2.1). As identified in the preceding section, differences between groups are an important factor in determining the

measure of overall inequality. As such, the rising share of part-time workers (who are relatively low paid compared to full-time workers) should increase individual income inequality. But how important has this effect been in practice?

Shift-share analysis can give some indication of the magnitude of the impact of the growth of part-time workers on labour income inequality (box 2.2). This involves recalculating the Gini coefficient based on an hypothetical scenario where the relative shares of full-time and part-time work are held constant at 1988-89 levels. The difference between the hypothetical Gini coefficient and the Gini coefficient calculated from the actual data approximates the effect of changes in share of part-time employees.

Box 2.2 **Shift-share analysis of the Gini coefficient**

It is possible to separately highlight the influence on the Gini coefficient of the change in shares of part- and full-time employees in the workforce and the changes in their incomes (that is, changes in the way part- and full-time employees are paid).

Probability density functions can be decomposed into non-overlapping sub-groups (Jenkins and Van Kerm 2004). In essence, the population probability density function is just the weighted (by population share) sum of the density functions of each non-overlapping sub-group. Thus, if the population can be divided into sub-groups, and the population shares are known, a counterfactual distribution can be calculated that holds population shares constant (but allows other distributional changes to occur as observed in the data). The difference between the Gini coefficient yielded by the counterfactual distribution and Gini coefficient yielded from the actual data approximates the effect of the changing population share on measured inequality.

Source: Jenkins and Van Kerm (2004).

As employees comprise 90 per cent of the workforce and drive overall distributional trends[8], this exercise was conducted for employee earnings only (excluding the self-employed). This approach facilitates the estimation of the specific effect of changes in part-time work, rather than joint changes in the share of all three work types. The Gini coefficient for employee earnings increased from 0.313 in 1988-89 to 0.388 in 2009-10.[9]

If the share of part- and full-time workers had remained at 1988-89 levels, but all other distributional changes had still taken place, then the Gini coefficient for employee earnings would have been 0.367 in 2009-10. This suggests around one

8 That is, inclusion of the self-employed changes the level of the Gini coefficient, but has little effects on trends on the Gini coefficient.

9 Over the same period, the Gini coefficient for labour income increased from 0.349 to 0.412.

quarter of the *increase* in the Gini-coefficient over the period was because of the rising share of part-time workers.

The remainder of the increase in inequality reflects the increasing dispersion of income between high and low income earners, primarily those working full-time (as pointed out in figure 2.7, inequality has been relatively stable among people working part-time). The following section examines this in more detail.

Have changes in labour income inequality measures for full- and part-time workers been driven by hours worked or hourly wages?

Among part-time and full-time workers, changes in income inequality reflect changes in two underlying determinants — wages and hours worked.

Prior to 1998-99, the HES provided limited data on hours worked, which also limits the analysis of hourly wages (which are imputed based on hours worked). For this reason, this section considers the period from 1998-99 to 2009-10. For the analysis, income deciles were calculated separately for full-time and part-time workers, based on weekly income.

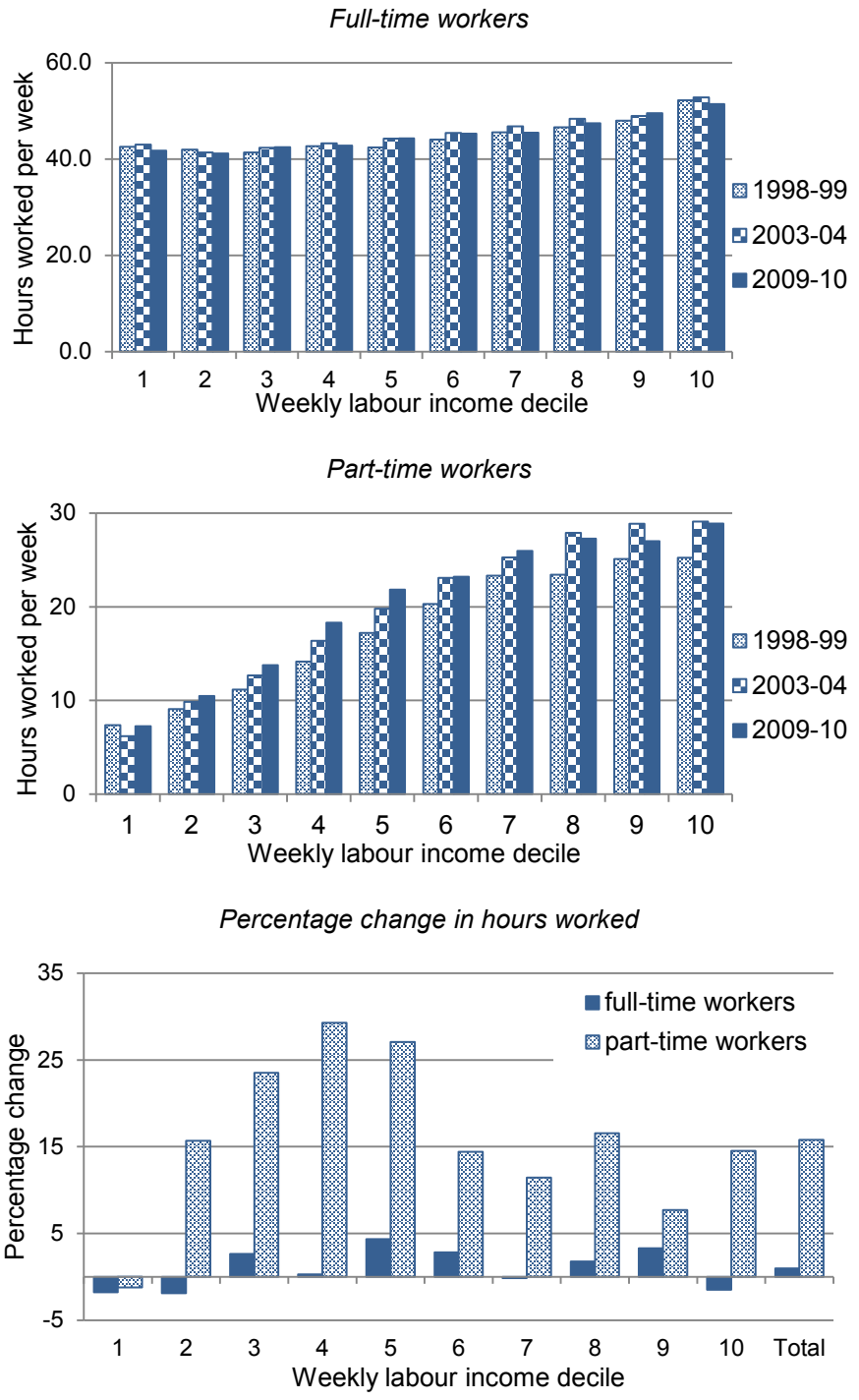
Hours worked

Unsurprisingly, higher working hours are associated with higher income for both full-time and part-time workers (figure 2.9). For example, in 2009-10 full-time workers in the 10th decile worked around 10 extra hours per week on average than those in the 1st decile, while for part-time workers the difference is around 22 hours.

Average working hours have been relatively stable for full-time workers, who worked around 45 hours per week in 2009-10. For part-time workers, average hours have increased substantially in all deciles (except the 1st), with particularly strong growth from the 3rd to the 5th decile. Overall, average hours worked for part-time workers increased from 17.6 in 1998-99 to 20.4[10] per week in 2009-10 (an increase of around 16 per cent).

10 Growth in average working hours for part-time workers is also found in ABS 6302.0, which suggests an increase from 17.7 hours per week to 22.4 hours per week.

Figure 2.9 **Hours worked by decile and worker type, 1998-99 to 2009-10**



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Wages

Average hourly wages are not gathered in the HES. The estimates presented here are based on respondents' reported hours usually worked (per week) and weekly income. This introduces two potential sources of error:

- individual sampling error in hours worked and weekly income will be compounded when these variables are combined to form hourly wage, increasing the uncertainty of the estimate
- midpoints are used for categorical hours worked data, reducing the precision of the average hourly estimate for each decile.

Estimates based on the HES suggest that in 2009-10, the average real hourly wage for a full-time worker was $31.10, and for a part-time worker it was $28.10.[11]

Like hours worked, hourly wages tend to be higher among higher (weekly) income deciles (figure 2.10). In 2009-10, the average hourly wage of $12.20 for the lowest deciles of full-time workers was considerably lower than the national minimum wage of $15.96. There are several possible causes.

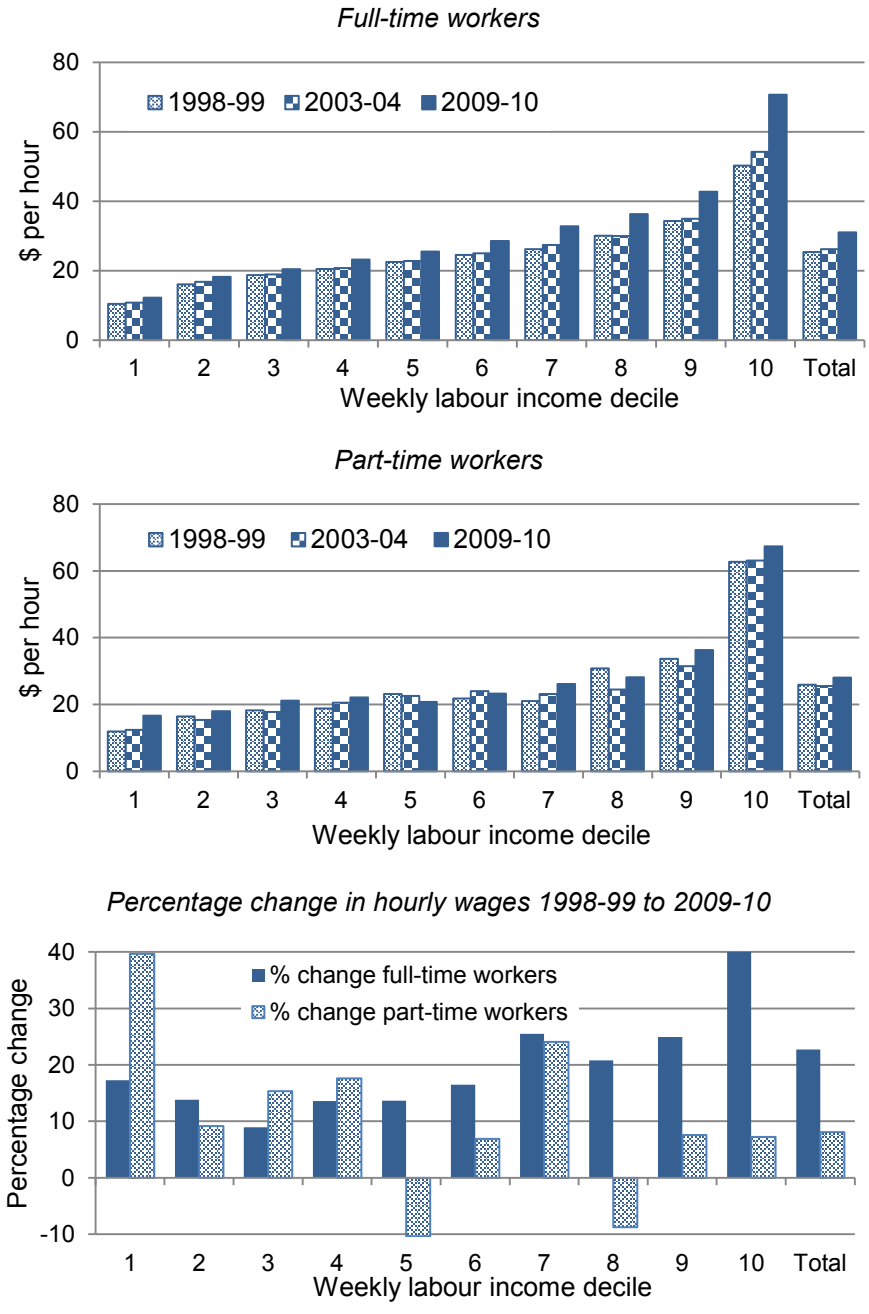
- Employees younger than 20 years of age can be paid less than the minimum wage. The lowest a junior employee can be paid is $5.87 per hour for someone less than 16 years of age.
- Trainees and apprentices can be paid less than the minimum wage. For example, the minimum rate for a first year apprentice is currently $10.22 per hour.
- Employees with a disability that affects their productive capacity can also be paid below the minimum wage (following an individual assessment and subject to meeting the impairment criteria for receipt of the Disability Support Pension).
- Some full-time employees may work unpaid overtime, or work long hours under contract.
- Some workers may overstate their working hours, or understate their wages (or both).

Another notable feature is that, in 2009-10, up to the 4th decile, hourly wage rates are similar between part-time and full-time workers (indeed part-time workers in the first deciles earn more per hour than their full-time counterparts). Hourly wages diverge between full-time and part-time workers beyond the 4th decile (though the gap never exceeds $10 an hour). This aligns with the finding that the hourly wage gap between full-time and part-time workers occurs because of differences in the

[11] Estimates based on ABS 6302.0 and converted to 2011-12 dollars are similar for part-time workers ($28.6 per hour) and higher for full-time workers ($33.6 per hour).

income of workers in the top half of the income distribution, not the bottom (Abhayaratna et al. 2008).

Figure 2.10 **Hourly real wage by decile and worker type, 1998-99 to 2009-10**



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

In contrast with trends in hours worked, growth in hourly wages has been much stronger for full-time workers than part-time workers since 1998-99 (23 per cent and 8 per cent respectively). Hourly wage growth amongst full-time workers has

been concentrated at the top end, with only the top four deciles exceeding overall average growth.

For part-time workers the trend is less clear (for example, there is strong growth in the 1st and the 7th decile and negative growth in 5th and 8th). Nevertheless, hourly wages have tended to grow at a faster rate in bottom deciles than the top.

What do changes in hours and wages mean?

Given relatively stable working hours among full-time workers over the last 10 years (1 per cent growth overall), the growth in average incomes appears to be driven by substantial increases in average hourly wages (around 23 per cent). For part-time workers, rising average wages and working hours have both contributed (8 per cent increase in hourly wages and 16 per cent increase in working hours).

As with changes in average income, observed increases in measured labour income inequality for full-time workers were caused mainly by increased dispersion in hourly wages, not working hours. Trends in the hourly wage rates and working hours of part-time workers do not appear to have resulted in greater inequality amongst this group of workers. This suggests that trends in the hourly wages of full-time workers are the main source of the rise in the 'within' groups aspect of inequality, and the major contributor to the increase in measured inequality in labour income for all workers more generally.

2.2 The impact of capital & other income

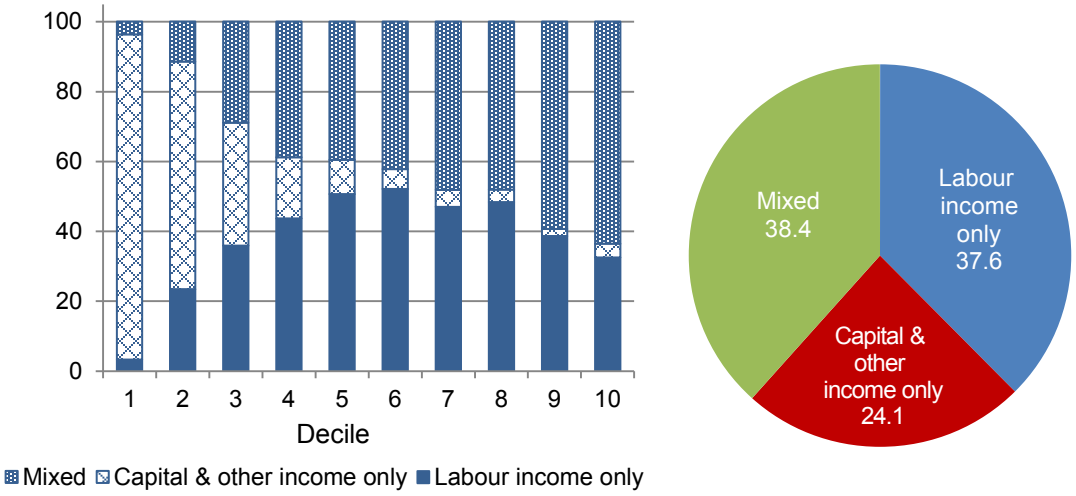
Many Australians have additional sources of private income beyond the direct remuneration they receive in exchange for their labour. They earn income from funds held in interest bearing deposits and securities as well as returns on other investments (such as equities, property etc.). In 2009-10, around 51 per cent of respondents to the HES reported receiving some type of capital income.[12]

Outside of inheritance, accumulation of capital tends to occur gradually over an individual's life, and capital income continues to be received after people retire and leave paid employment. For these reasons, the population of people who receive capital income is different from those considered earlier in terms of their labour

[12] Capital & other income is defined as: non-zero net investment income made up of interest, rent, dividends and royalties including that from superannuation (capital income) and non-zero income from private transfers made up of income from workers' compensation, scholarships, child support and other private sources (other income).

force income — only around 38 per cent of respondents reported receiving both types of income (figure 2.11). The bottom two deciles of market income are mainly comprised of people receiving capital income only. Beyond the fourth decile, almost everyone is employed (or self-employed) and the proportion of those also receiving some capital income increases by decile (reaching around 64 per cent for the 10th decile).

Figure 2.11 **Composition of market income, 2009-10**
Per cent



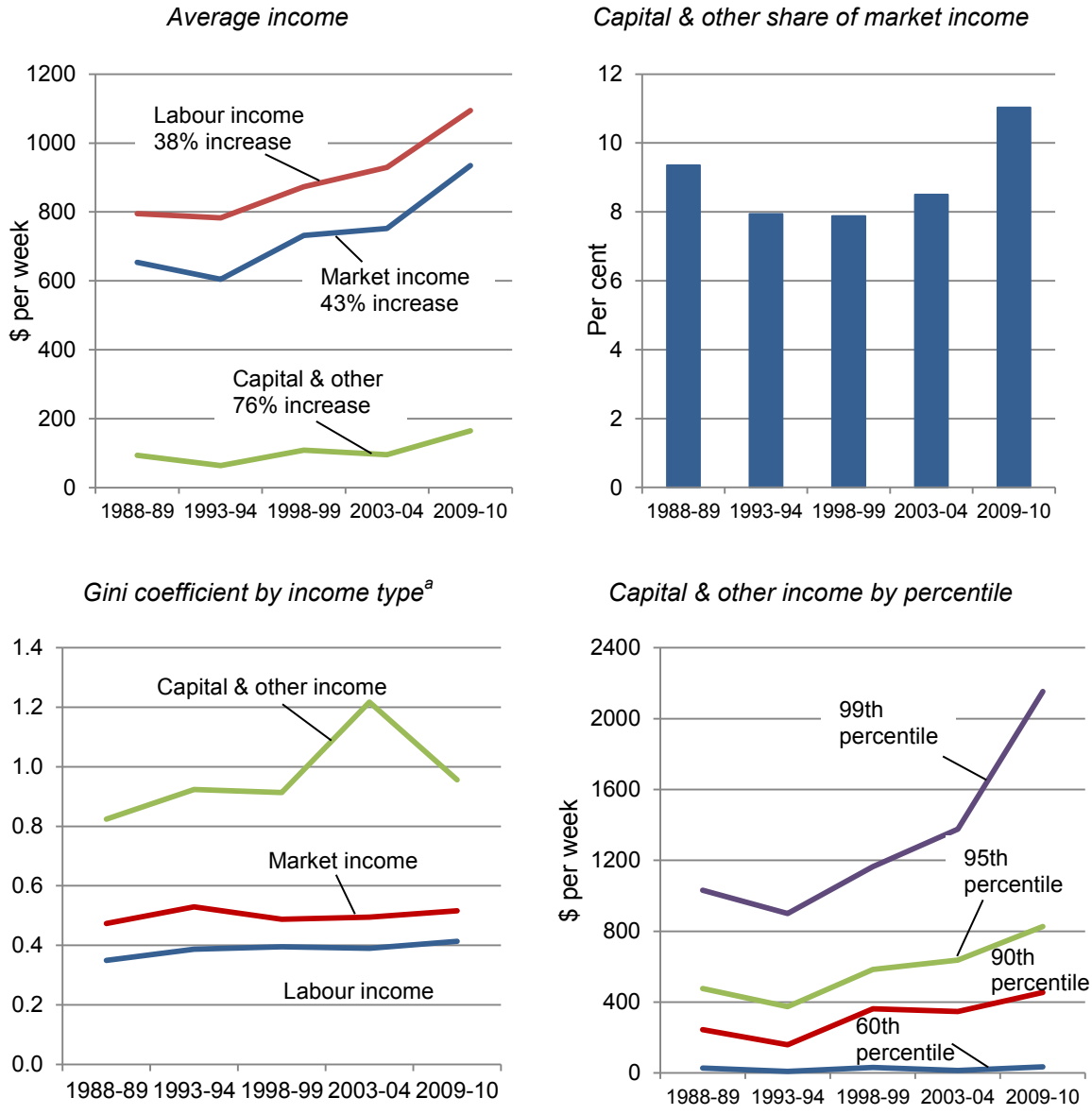
Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Average capital incomes have varied around an upward trend over the last 20 years in the HES data. It is not clear whether this is an inherent feature of this type of income (for example, due to business or asset price cycles) or whether it reflects difficulties in accurate measurement. Nevertheless, capital & other income appears to have trended upwards (figure 2.12), with its overall growth (76 per cent since 1988-89) exceeding the growth of labour income (the majority of the growth in capital income occurred between 2003-04 and 2009-10).

This growth comes off a substantially smaller base. In 2009-10, the average capital income was around $165 per week, compared with an average of around $1100 for labour income. Similarly, the total amount of capital & other income earned is relatively small compared with that earned from participation in the labour market. In 2009-10, capital & other income represented around 11 per cent of total market income. This has trended upwards since 1993-94. (The share of capital & other income fell between 1988-89 and 1993-94 possibly reflecting the impact of the economic downturn.)

Capital & other income is highly unequally distributed, and has become more unequal over time. For most people who receive *any* capital income, the amount is very small — 60 per cent earned less than $35 per week in 2009-10. Unlike labour income, the growth in capital income has been concentrated in the upper portion of the distribution. While the capital income of 60th percentile and below has changed little in real terms over the last 20 years, the 90th, 95th and 99th percentiles have increased by 86 per cent, 73 per cent and 109 per cent respectively.

Figure 2.12 **Trends in components of market income, 1988-89 to 2009-10**



[a] The Gini coefficient for capital & other income exceeds 1 in 2003-04 due to the presence of large negative incomes.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

2.3 Earnings of men, women and the top '1 per cent'

Trends in the distribution of income can be examined in a multitude of different dimensions. However, two areas attract particular attention:

- pay differences between men and women
- the incomes of the very top earners (the '1 per cent).

The complexity of both issues gives rise to diverse presentations of evidence and (often hotly) contested interpretations. The vast majority of this debate is beyond the scope of this paper. Here a comparatively limited approach is adopted – focussing on the extent to which income differences observed between these groups impact on summary measures of inequality.

The impact of the gender pay gap on inequality

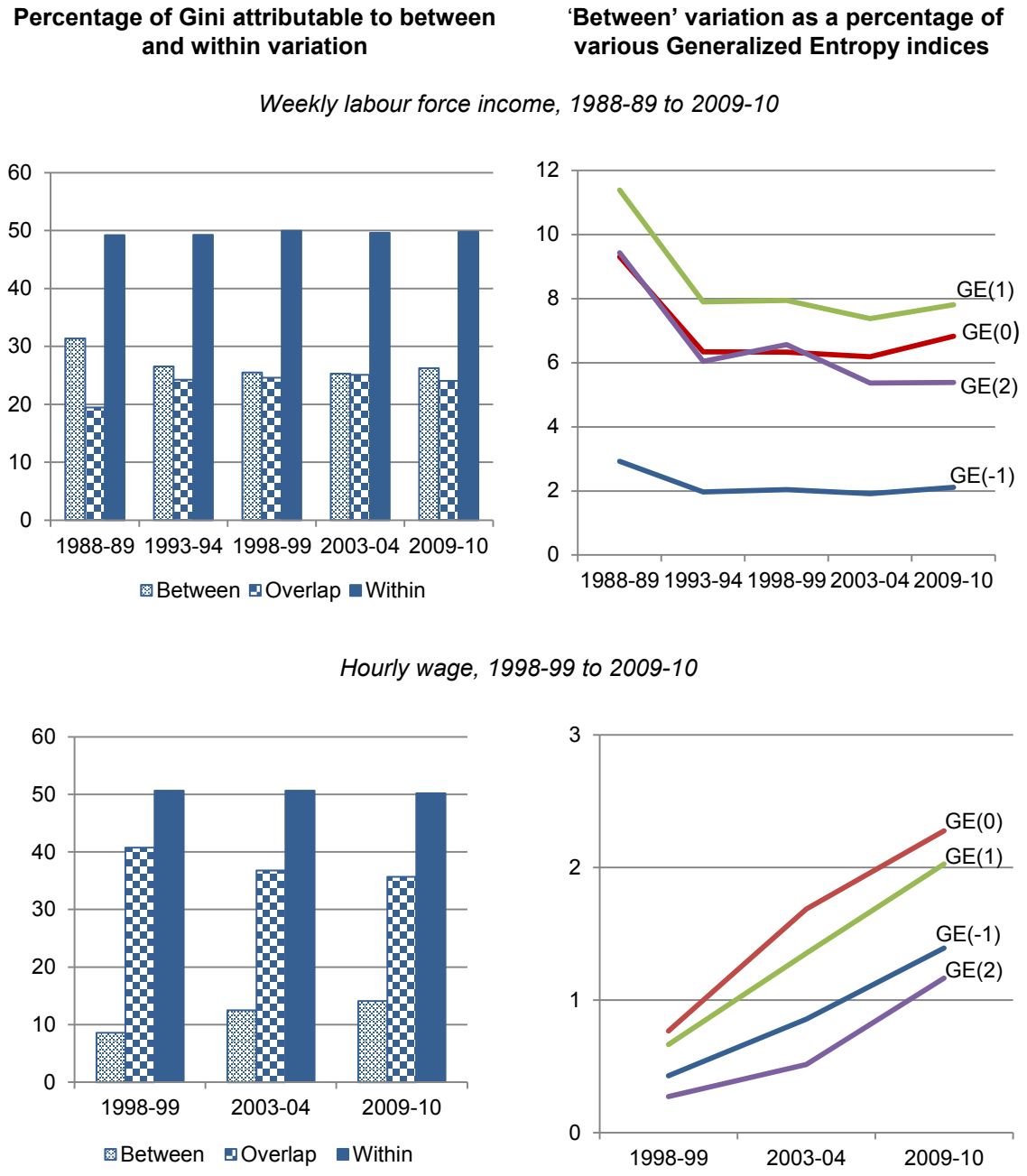
Disparity between average male and female earnings is a persistent feature of the Australian labour market. In May 2012, women's ordinary full-time earnings were 18 per cent lower than men's. This difference has been relatively stable over the last 20 years, and has trended gradually upward over the last 10 years (ABS 2012b). Non-managerial adult hourly wages in 2012 were almost 11 per cent lower for women working full-time than men (ABS 2012c).

This raises the question as to how much the gender pay gap impacts on overall inequality, and if it has contributed to observed trends in measured income inequality.

The contribution of the gender pay gap to measures of inequality can be examined through the decomposition techniques discussed above (box 2.2). In this case, the greater the contribution of variation 'between' groups (that is, the average difference in men's and women's wages) to the Gini coefficient, the greater the effect of the gender pay gap on overall income inequality.

In terms of weekly income, decomposition analysis suggests around 25 per cent of the Gini coefficient can be attributed to differences in men and women's average earnings in 2009 (figure 2.13). However, this result is influenced by the difference in average working hours, as a considerably higher proportion of women work part-time compared to men. For this reason, the impact of the gender pay gap on measures of inequality is more appropriately examined using *hourly* wages.

Figure 2.13 **Decomposition of weekly income and wage by gender**
Per cent



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Decomposition analysis of hourly wages suggests that differences between men and women accounted for around 15 per cent of the Gini coefficient in 2009-10. In contrast to the decompositions of the Gini coefficient by employment type (section 2.1 above), the unexplained portion of the Gini coefficient is relatively high (around 35 per cent of the Gini coefficient cannot be decomposed by gender). As an

additional check, a range of other summary measures of income inequality (specifically, generalized entropy indices — appendix A) were also estimated and decomposed (figure 2.13, right panels). Generalized entropy indices suggest an even lower contribution at between 1 and 2.5 per cent.

Although decomposition of all indices suggests that the contribution of the average hourly wage gap between men and women to labour income inequality has grown over time, it remains very small.

The decompositions suggest that the differences in earnings between women and other women (and men and other men) are the important driver of labour income inequality, not average differences between the two groups. In 2009-10, income inequality among men was higher than among women for every category (table 2.1). Nevertheless, trends for both men and women mirror aggregate (combined) distributional trends— inequality was relatively stable for part-time workers, grew amongst full-time workers, and for labour earnings in general. This suggests that overall trends have been a result of factors that affect both men and women (albeit, the trends are more pronounced for men). In addition, inequality in hourly wages has increased for men since 1998, but has been stable for women.

Table 2.1 **Gini coefficient by gender and type of work**

	Full-time workers		*Part-time workers*		*Labour income*		*Hourly wages*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*		*Female*
1988-89	0.25	0.21	0.51	0.38	0.32	0.35		
1993-94	0.26	0.21	0.52	0.39	0.36	0.39		
1998-99	0.28	0.22	0.47	0.39	0.38	0.38	0.29	0.27
2003-04	0.29	0.23	0.48	0.37	0.38	0.37	0.31	0.25
2009-10	0.33	0.25	0.49	0.36	0.41	0.38	0.32	0.27
% change	*31.7*	*22.7*	*-3.1*	*-3.3*	*28.9*	*7.8*	*11.2*	*1.5*

Source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

How important is the top '1 per cent'?

The top 1 per cent of income earners attract considerable public attention. Yet their contribution to the overall income distribution, and how it changes over time, is not obvious using standard graphical techniques (such as figure 2.4 above). It is also more difficult to accurately measure the incomes of the top 1 per cent due to lower survey response rates that are not accounted for in sample weighting procedures.

For this reason, the ABS does not recommend analysis of this group based on HES. Notwithstanding this caution, the HES does provide useful 'proxy' information on this group. As a basic check, the top average income for the top three percentiles are consistent with the income ranges for these percentiles based on ATO data (ATO 2012).[13]

As a group, the top 1 per cent earn a disproportionally larger share of the total income, for all types of worker. (This is true by definition for all non-uniform distributions of income). The share earned by the top 1 per cent is largest for self-employed workers (around 16 per cent in 2009-10) and is between 5 and 7 per cent for other worker types (figure 2.14). The share of total income earned by the top 1 per cent has trended upwards over the last 20 years for all types of worker.

Another way to examine how the top 1 per cent shapes the overall distribution of income is by calculating their contribution to summary measures. This essentially asks: *How would measured inequality change if the current top 1 per cent were removed from the distribution?*

In 2009, the Gini coefficient for labour earnings would have been around 6.5 per cent lower if the top 1 per cent were not represented (a change in the Gini coefficient of around 0.02). The HES data also suggest that the top 1 per cent is making a greater contribution to measured changes in the Gini coefficient over time — but this trend is very gradual.[14] Using the Gini coefficient, the overall trends identified in figure 2.6 (above) are not changed with the exclusion of the 1 per cent.

In short, analysis of data from the HES for employed workers over the period 1988-89 to 2009-10 suggest that the '1 per cent' have a significant level effect on inequality (as measured by the Gini coefficient) but changes in income for this group are not overly accounting for the rise in measured labour income inequality between 1988-89 and 2009-10.[15] This would suggest that the effect of the top 1 per cent of earners as being major contributors to rising inequality over the longer run, as found by other researchers (such as Leigh 2005 and Atkinson, Piketty and Saez 2011) has moderated between 1988-89 to 2009-10.

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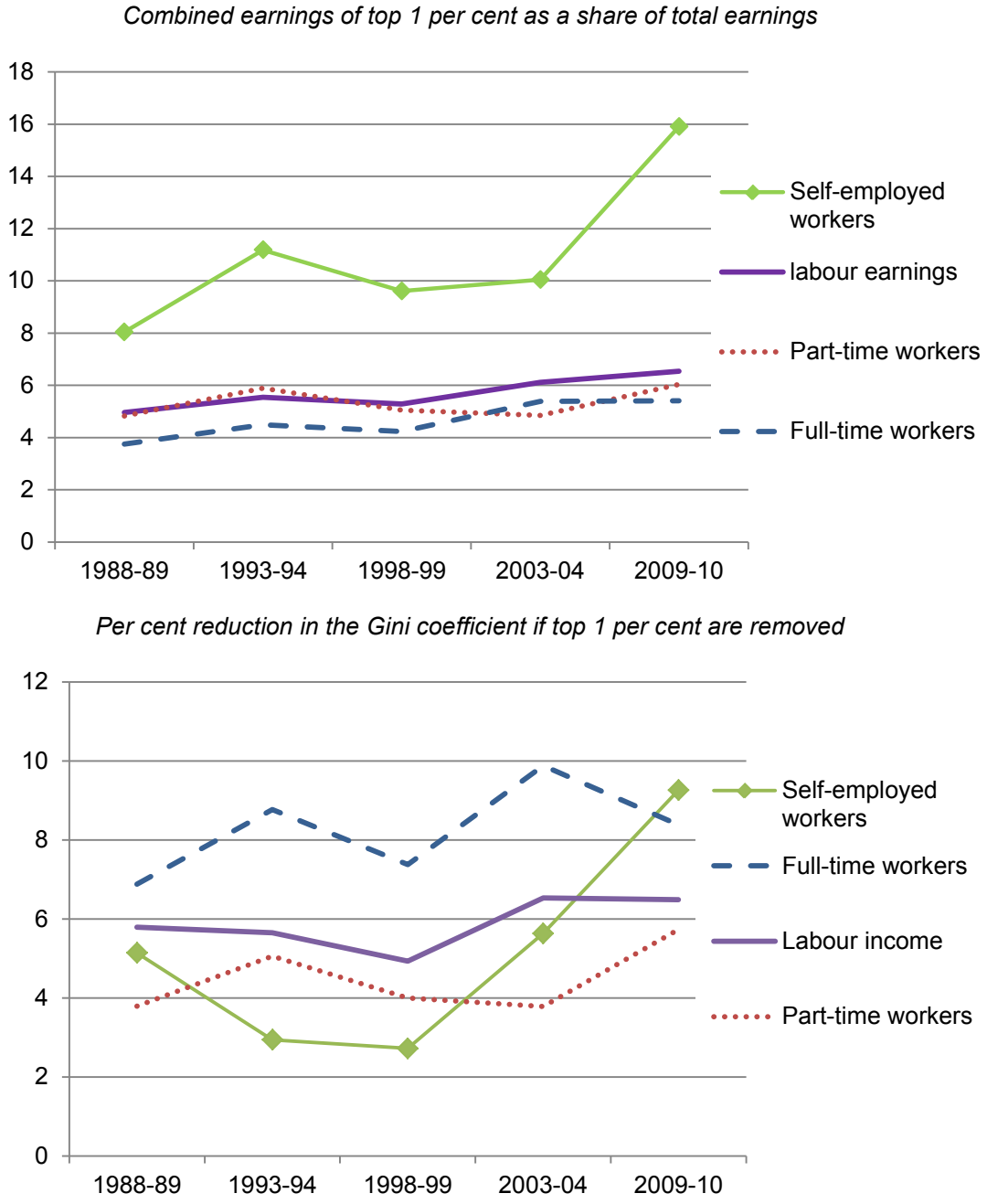
13 In any event, measurement error in the top 1 per cent will also affect overall income averages and distributional measures. At the very least approach, this allows analysis of the impact of the *measured* top 1 per cent on the *measured* distribution.

14 For example there is less than one percentage point difference between the contribution of the top one per cent to Gini for labour earnings between 1989 and 2008. The increase is greatest amongst the self-employed at around 4 percentage points.

15 This finding is unchanged when examining the impact of the top 1 per cent on market income (including capital).

Figure 2.14 **Distributional impact of the top 1 per cent, 1988-89 to 2009-10**
Per cent



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

3 Household income

Key points

- The growth in real incomes for most Australians between 1988-89 and 2009-10 has progressively shifted the distribution of household income to the right.
- Over the same period, a wider 'spread' of incomes has caused the distribution to become 'flatter' and income inequality to increase.
  - These changes are more pronounced over the period 2003-04 to 2009-10.
- Of the various income components, household labour income growth has been the major driver of changes in incomes.
  - For households in the bottom gross income deciles (2 to 4), labour income growth has been driven by increased workforce participation and employment.
  - For households in the top income deciles (8 to 10), labour income growth appears to have been driven by higher wages.
  - For households in the middle decile both factors are apparently at work.
- The distribution of 'capital & other' income is responsible for much of the recent increase in measured gross income inequality.
  - While most Australian households do not report significant income from this source with a few, mainly in the 10th decile, earn large amounts.
- Increases in the real value of direct government payments have contributed to increasing the real incomes of households in the bottom four deciles.
- Taxes and indirect transfers have a significant equalising impact on the distribution of household income. Trends in each, however, differ.
  - The equalising impact of taxes on household income distribution has declined.
  - Notwithstanding compositional shifts, the influence of indirect benefits has changed little.
- Changes in household composition and family formation do not appear to have had significant impacts on the distribution of household income in recent years.
- Overall, changes in final equivalised household income inequality have predominately flowed from changes in labour and capital & other income.
- The proportion of working age jobless households has fallen over the past 20 years with the most dramatic fall recorded over the period 2003-04 to 2009-10.
  - The gap in equivalised final incomes between remaining jobless households and other households has increased.

Most individuals live within family groups or households where they can combine income with other household members. For this reason, the actual resources available to households are often not fully captured in the analysis of individual market incomes. Further, government assistance is often targeted at the household level (household means testing, family payments, in-kind services, couple versus single pensions amongst others) influencing the final income of household members. This means that the distribution of income at the household level is often quite different from that seen amongst individuals (as examined in chapter 2). OECD evidence suggests that across member nations, the distributions of household income are generally less spread than individual earnings (OECD 2011)

This chapter extends the analysis of the distribution of income in Australia to households (defined by the ABS as a person living alone or a group of people who usually reside in the same private dwelling). The chapter begins with an analysis of gross income and 'works up' to final equivalised household income (defined in chapter 1) in order to uncover how different forms of income affect the distribution. Particular attention is paid to:

- the three components of gross household income — labour income, capital income and direct government benefits
- direct and indirect taxes and indirect benefits
- household composition and family formation.

As in chapter 2, the consumer price index has been used convert all income figures to 2011-12 dollars throughout this chapter.

3.1 The distribution of gross household income

Gross household income represents the income households receive from market sources (employee earnings, self-employment returns, capital & other income) and direct government payments.

The distribution of gross household incomes has changed over the past 20 years.[1] Notably, both real mean and median incomes have risen significantly (table 3.1). Between 1988-89 and 2009-10 mean incomes have risen faster than median

[1] The observed data are influenced by improvements in survey methodology over time (see appendix B for more details). In each HES, the measure of income is refined to provide values that better match the conceptual definitions used — most notably in the 2003-04 and 2009-10 HESs. However, such improvements appear to have only had a minor impact on the observed trends and instead have influenced levels — see Annex and appendix B for details.

incomes, creating a distribution that has become more skewed to the right. Further, while the gap in incomes between the 1st percentile and 99th percentile remained stable from 1988-89 to 1998-99, greater relative increases in average incomes of the 99th percentile over the most recent period from 2003-04 to 2009-10, have widened this gap considerably.[2] This, coupled with the increase in the standard deviation of gross household income, indicates the dispersion in the distribution has increased between 2003-04 and 2009–10.

Table 3.1 **Summary characteristics of weekly gross household income**
2011-12 dollars per week

Year	*Mean*	*Median*	*Standard deviation*	*Mean 1st percentile*	*Mean 99th percentile*
1988-89	1 234	1 046	998	-256	6 504
1993-94	1 178	959	1 006	-602	6 173
1998-99	1 305	1 055	1 062	-613	6 161
2003-04	1 410	1 163	1 153	-113	7 399
2009-10	1 776	1 388	1 783	-76	11 908

Source: ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Plotted as a probability distribution, changes in the distribution of gross weekly household income have followed a reasonably consistent pattern over the period. The distribution has become flatter, with a general shift towards higher incomes and a falling concentration of households earning less than $500 per week (figure 3.1).

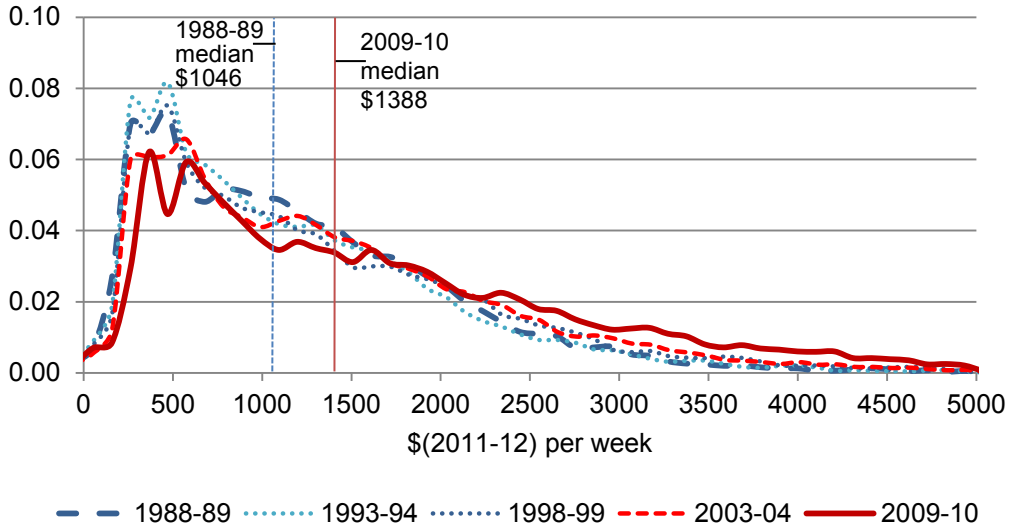
The trend towards a flatter distribution accelerated between 2003-04 and 2009-10. The distribution of household income shifted further to the right over this period — meaning real gross incomes at the lowest end of the distribution have risen faster than during previous survey periods. During this period, there has also been an increase in the proportion of households earning gross incomes above $2000 per week. What is not shown in figure 3.1 is the lengthening of the 'upper tail' of the distribution which has contributed to a greater spread in incomes.

The combination of the flattening of the distribution, and lengthening of the tail has resulted in an increase in measured inequality. Using the Gini coefficient, inequality has risen from 0.393 in 1988-89 to 0.426 in 2009-10. However, simply focusing on inequality measures ignores the strong growth in incomes for all groups across gross income deciles (figure 3.2). Average annual growth rates in gross household income over the period have been highest in the bottom and top deciles and lowest for those in the 4th and 5th decile — creating a U-shaped pattern.

2 Mean income for those in the 1st percentile is negative due to the reported losses from an own unincorporated business or negative investment returns.

Figure 3.1 **Distribution of gross household income, 1988-89 to 2009-10**

Proportion of all households[a]

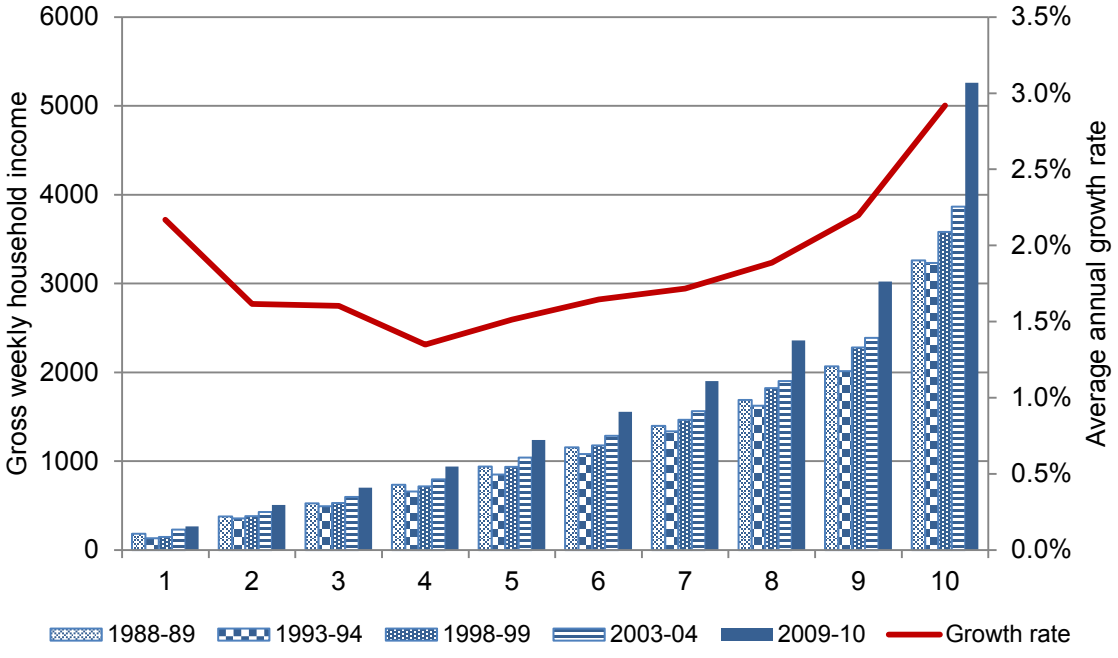


[a] For presentation purposes only the income range between $0 and $5000 shown. Negative and gross household incomes greater than $5000 are present in the data.

Data Source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Figure 3.2 **Real incomes by gross income deciles, 1988-89 to 2009-10**

2011-12 dollars, 1 lowest decile, 10 highest[a]



[a] Left axis gross weekly household income, right axis average annual growth rate of gross weekly household income.

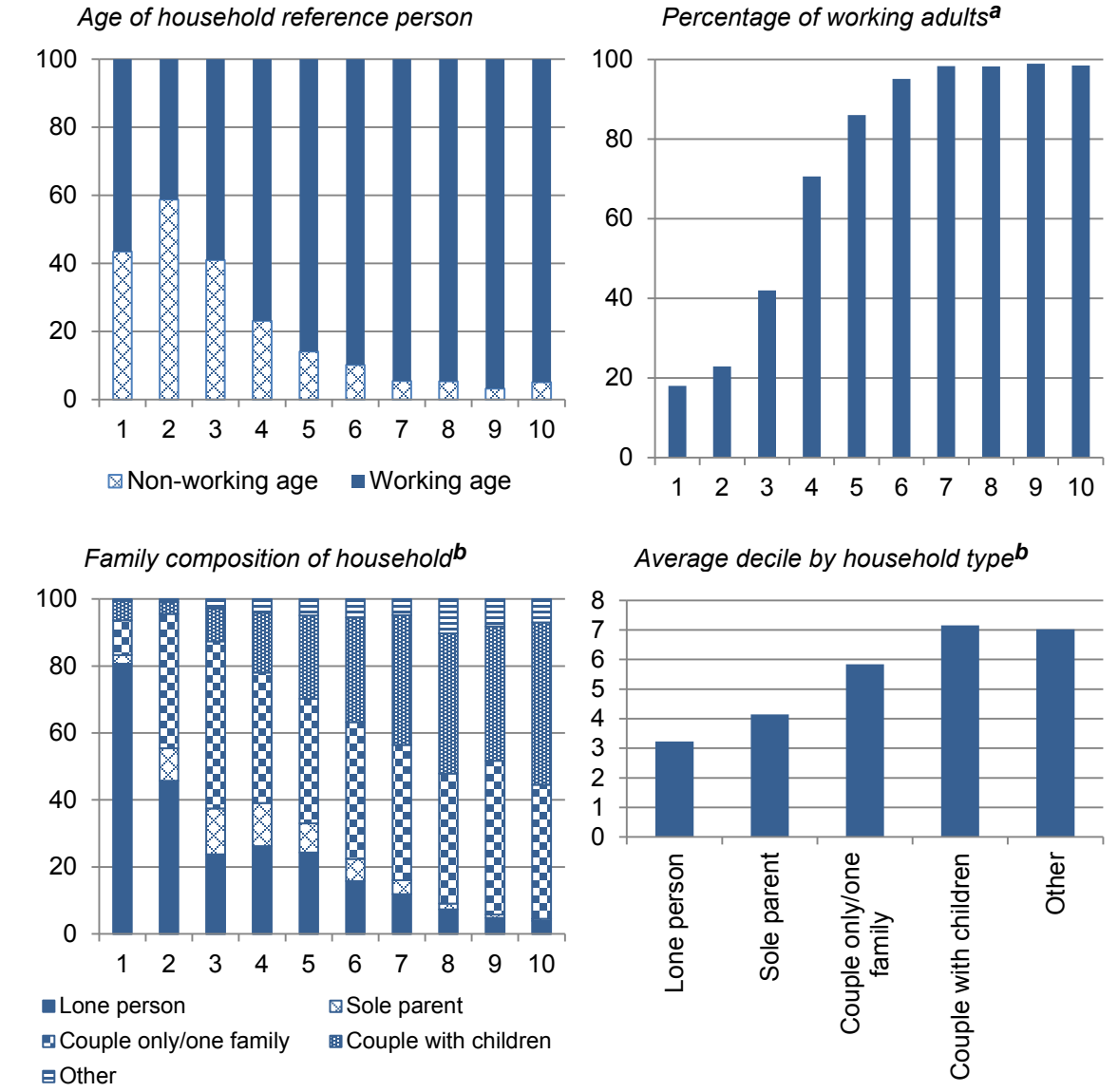
Data source: ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Household characteristics across the deciles

The composition of household types within the deciles varies. In 2009-10, non-working age households (those where the reference person was aged over 65 years) made up a greater share of the bottom three deciles compared with other deciles (figure 3.3, top left panel). This, in part, explains why lower deciles have a much lower proportion of adult household members employed in the workforce (either as employees or self-employed) (figure 3.3, top right panel).

Figure 3.3 **Selected household characteristics by decile, 2009-10**

Per cent, average decile score — 1 lowest decile, 10 highest



[a] Percentage of working adults represents the average percentage of adults in a household who earn labour income. [b] One family households include family households without dependent children.

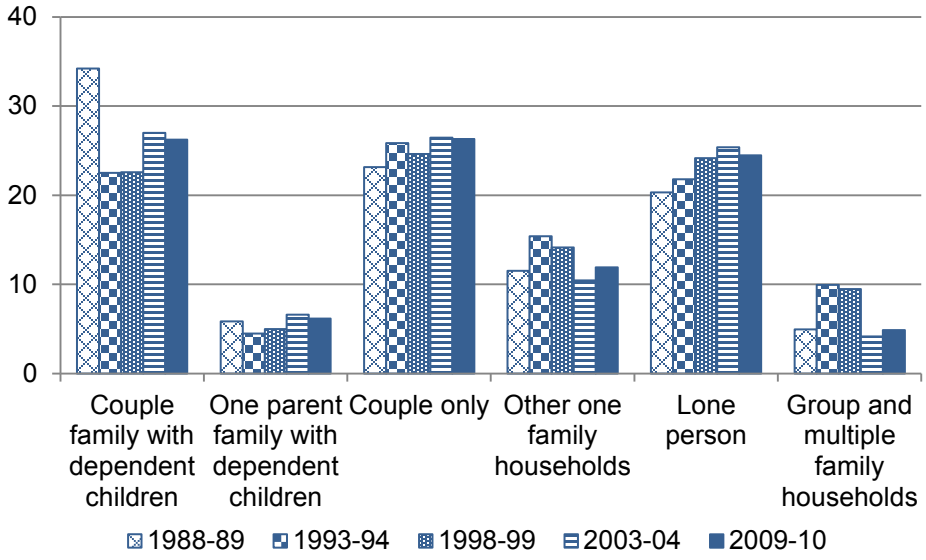
Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Broad household types are not consistently distributed amongst gross income deciles (figure 3.3, bottom left panel). Lower deciles are dominated by lone person households with higher deciles dominated by couple households (with or without dependent children). Sole parent families make up a greater proportion of the lower deciles, with most earning gross incomes in the 2nd to 5th income deciles range.

Since 1988-89 there has also been some change in the make-up of Australian households (figure 3.4). While data for 1988-89 are complicated by definitional changes, there appears to have been an increase since 1993-94 in households with children (couple and one parent). There has also been a rise in the proportion of lone person households, although this has lessened between 2003-04 and 2009-10.

Figure 3.4 **Shares of household types, 1988-89 to 2009-10**

Per cent of all households[a]



[a] Other one family households include households with one couple (or lone parent) and non-dependent children, one couple (or lone parent) with or without non-dependent children but with other relatives, one couple (or lone parent) with or without non-dependent children or other relatives but with unrelated individual or two or more related individuals where the relationship is not a couple or parent-child relationship (for example, two sisters).

Data source: ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

3.2 What has contributed to the change in the distribution of gross household income?

The first step to understanding what has contributed to the change in the distribution of household income is to break down gross income into its components:

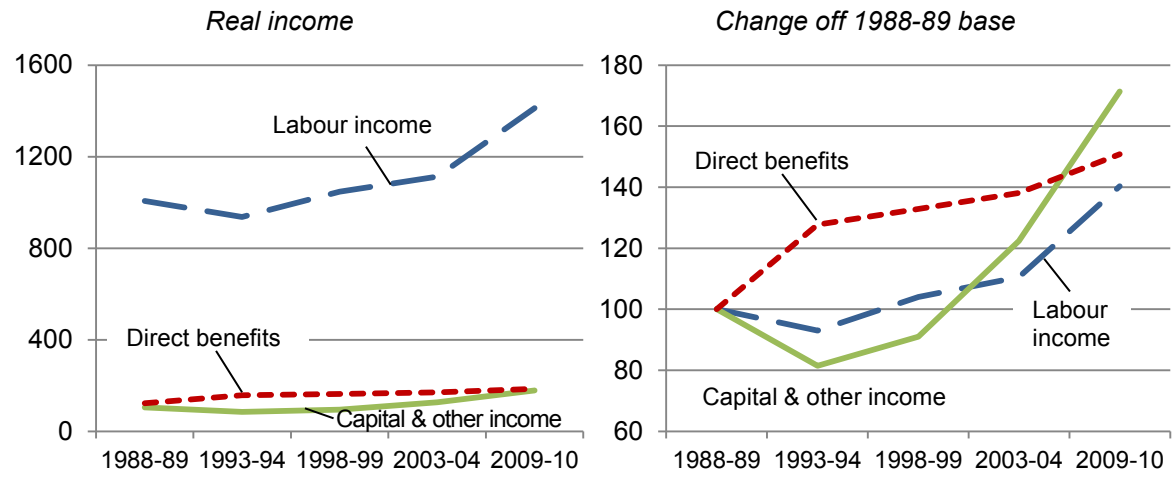
- labour income — employee earnings (wage and salaries) and own unincorporated business returns[3]
- capital & other income — capital returns and other private transfers such as insurance payments
- direct government benefits — direct transfer payments from governments.

Relative contributions of different income sources to changes in gross household income

Between 1988-89 and 2009-10, average labour, capital & other and direct government benefits received by households has increased in real terms (figure 3.5), contributing to 75, 14 and 12 per cent respectively of the increase in gross household income between 1988-89 and 2009-10. However, the importance of each component across gross income deciles varies (figure 3.6).

Figure 3.5 **Components of average weekly gross income 1988-89 to 2009-10**

2011-12 dollars



Data source: ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

[3] Labour earnings are defined as non-zero employee earnings (wages and salaries) and non-zero income from a person's own unincorporated business. The latter is included to represent the returns to labour supplied to a household's own business, but will also likely include returns to capital invested in the business. However, as no 'imputed wage' is available for unincorporated business owners, this represents the best proxy for labour earnings.

Figure 3.6 **Components of gross household income by decile, 1988-89 to 2009-10**

Proportion of income, 1 lowest decile, 10 highest

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

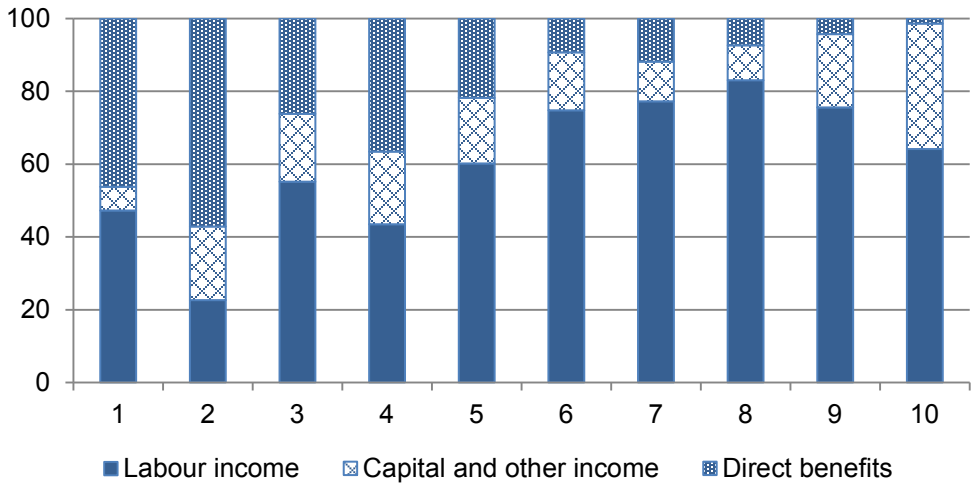
In keeping with being the major source of household income, growth in labour income has also been the dominant source of the absolute growth in gross household incomes. Changes in labour income have accounted for at least 50 per cent of the total changes in average gross household income between survey periods. It has played an even greater role in the period between 2003-04 and 2009-10 — accounting for 72 per cent of the total change. Despite this, direct government benefits and capital & other income have experienced the fastest rates of increase (albeit off a much lower base).

Across deciles, incomes for those in the bottom are dominated by government payments, whereas for those in the top labour income dominates (figure 3.6). One notable change since 1988-89 is the increase in the labour income share (and to a lesser extent the capital & other income share) in total income for households in the bottom three deciles. This trend accelerated in the period between 2003-04 and 2009-10.

The relative contribution to income growth of each income source also varies by decile (figure 3.7). On average, increases in government payments have explained much of the change in gross incomes in the lower deciles, with labour income of more significance in higher deciles. And while changes in capital & other income have played a role for all deciles, the largest changes have been in the 10th decile.

Figure 3.7 **Average contribution of income sources to changes in gross household income by decile, 1988-89 to 2009-10**

Per cent, 1 lowest decile, 10 highest



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Contributions to measured gross household income inequality

The Gini coefficient for gross household incomes can also be decomposed into the contribution of each income component to total inequality (box 3.1). This depicts the influence that each income source has on overall measured inequality.

Box 3.1 **Decomposing gross household income inequality**

As gross household income is the sum of various income components (for this study, labour income, capital & other income and direct government benefits), the Gini coefficient can be decomposed to identify the contribution of each income source to inequality in gross incomes (Van Kerm 2010).

The 'contribution' of each income source represents how much of the observed level of inequality in total income is due to the inequality in the income source. In instances where the source income is negatively related to total income, such as benefit payments, the contribution will be negative.

The decomposition also allows for the sensitivity of the Gini coefficient to each income source to be estimated. The sensitivity estimate represents the impact that a 1 per cent increase in source income (given its current distribution) would have on the Gini coefficient. It should be noted that such estimates cannot be generalised to actual changes that may occur from changing income levels as they do not account where such income would come from or any second round responses to such income changes.

For this study, decompositions were calculated in Stata using the *sgini* command (Van Kerm 2010).

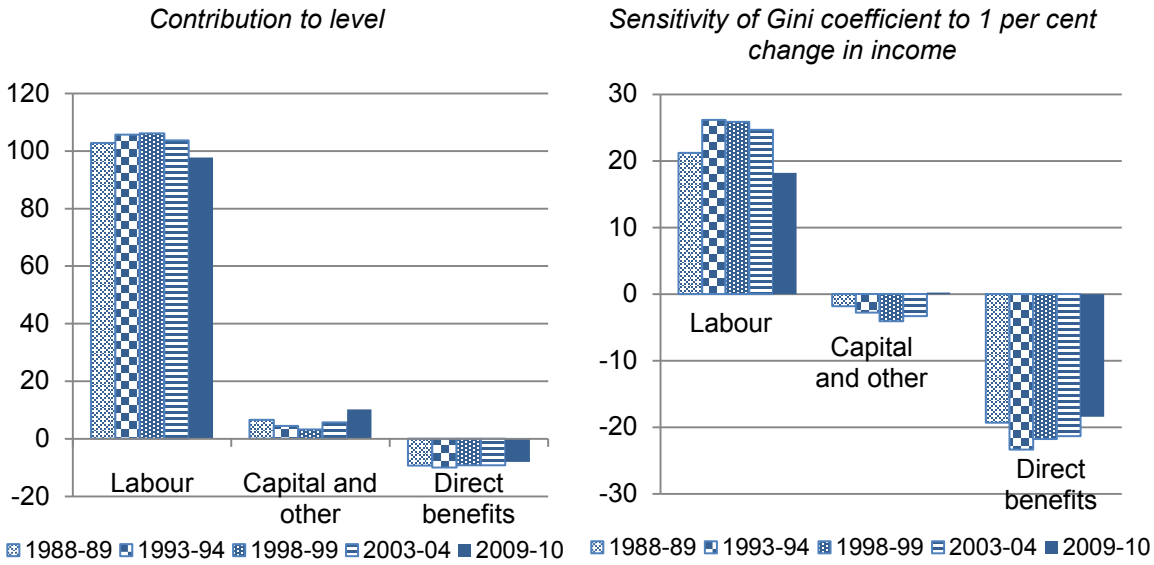
Labour income contributes to most of the measured inequality in gross household income (figure 3.8 left panel). However, despite its relatively stable share of total gross income, the contribution of labour income to total gross household income inequality has fallen over time — from 103 to 98 per cent. While only a small component, capital & other income has been contributing more to gross income inequality in recent years. While direct government benefits have had a negative impact on the gross income Gini coefficient, the equalising effect has declined slightly since 1993-94, back to levels similar to those observed in 1988-89.

The sensitivity estimates represent the effect of a 1 per cent change in component income (given its current distribution) on the Gini coefficient for gross household income. These cannot be generalised into any policy evaluation as the estimates ignore any consideration of where the income would come from (for example, increased direct government benefits would require higher taxes) or any second round effects from changes in income (continuing the example, any responses from households who receive the higher benefits or those who pay higher taxes). They

only show the relative sensitivities of the Gini coefficient estimate to each income source examined, all else given. The estimate for labour income is large, but has declined since 1993-94. The sensitivity estimates also reveal the significant impact of direct government benefits in reducing gross household income inequality. In all but 2009-10 the sensitivity estimates for capital & other income are negative. This is likely to be due to relatively high amounts of capital & other income earned by some low gross income households such as self-funded retirees.

Figure 3.8 **Income source contribution to the gross household income Gini coefficient and its sensitivity, 1988-89 to 2009-10**

Per cent



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Increased employment is driving labour earnings change, but wages are also important

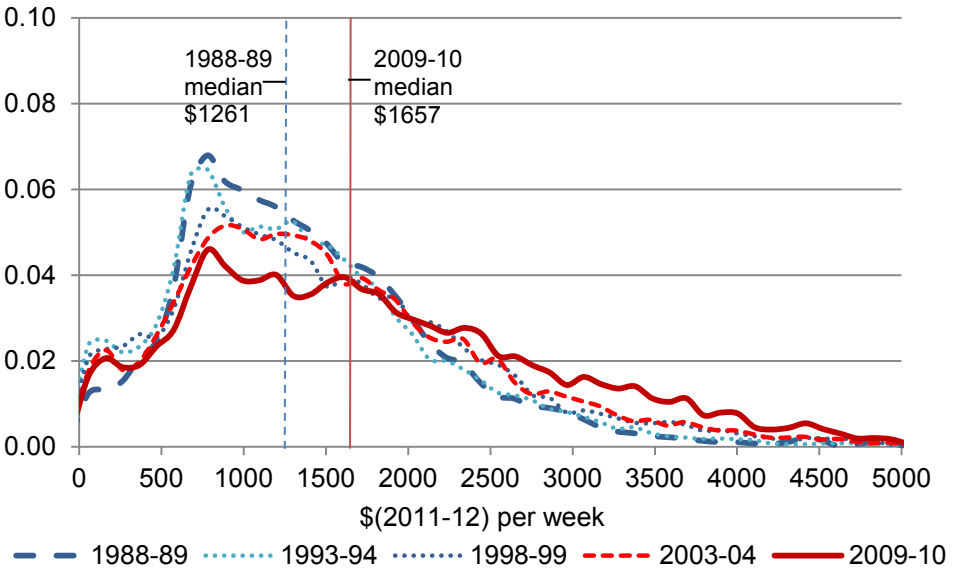
The distribution of labour income for working households (excluding those with zero labour income) has become significantly 'flatter' over time (figure 3.9). The proportion of working households earning less than $1000 per week has fallen substantially — a trend that appears to have accelerated over the period between 2003-04 and 2009-10. Reflecting the flattening and wider spread in the distribution, a growing share of households earn incomes over $2000 a week (from around 20 per cent of households in 2003-04 to over 30 per cent in 2009-10).

Average real labour incomes for working households increased from $1405 in 1988-89, to $1951 in 2009-10. Measured dispersion or inequality also increased,

particularly over the most recent period. Inequality in labour income for working households, as measured by the Gini coefficient rose from 0.323 in 1988-89 to 0.382 in 2009-10, with a (statistically) significant increase occurring since 2003-04 when the Gini coefficient was 0.358. And, while the upper tail has extended over this recent period (from a maximum recorded gross income of $17 263 per week in 2003-04 to $20 784 in 2009-10), most of the change in the Gini coefficient is a result of distributional changes described above (box 3.2).

Figure 3.9 **Distribution of household labour income of working households, 1988-89 to 2009-10**

Proportion of working households[a]



[a] For presentation purposes only the income range between $0 and $5000 shown. Negative and labour household incomes greater than $5000 are present in the data.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Much of the change in labour earnings for households — both for the level of earnings and the shape of the distribution — appears to be driven by greater employment by household members. While data are only comparable in the 1998-99, 2003-04 and 2009-10 surveys, average household workforce employment rates increased from around 56 per cent in 1998-99 to 60 per cent in 2009-10 (table 3.2). Commensurate with this, average hours supplied to the workforce per household have increased. These changes are consistent with those observed in individual working patterns, with increasing employment (particularly part-time) along with higher average hours worked by part-time employees (chapter 2).

The changes observed in employment could be driven by:

- changes in the shares of household types which have different employment rates
- changes in the employment patterns within household type.

Box 3.2 **Are increases in the upper tail responsible for the observed increase in the Gini coefficient between 2003-04 and 2009-10?**

To explore the effect on the Gini coefficient of an increasing upper tail of the labour income distribution between 2003-04 and 2009-10 a sensitivity test was conducted. The Gini coefficient was recalculated excluding households with labour incomes greater than the maximum observed in 2003-04 (approximately 0.1 per cent of working households in 2009-10).

Making this adjustment, the Gini coefficient in 2009-10 was 0.377 compared with 0.382. This suggests that around 20 per cent of the increase in the Gini coefficient over the period was due to increases in the upper tail of the distribution.

The share of household types, however, has remained relatively stable over the period examined. The largest increase has occurred in couple family households with dependent children (23 to 26 per cent) and the largest fall has been in group and multiple family households (9 to 5 per cent) — both of these groups have relatively high employment rates. This suggests that changes in household types have not played a significant role in the changing pattern of employment.

Table 3.2 **Household employment and labour supply, 1998-99 to 2009-10**

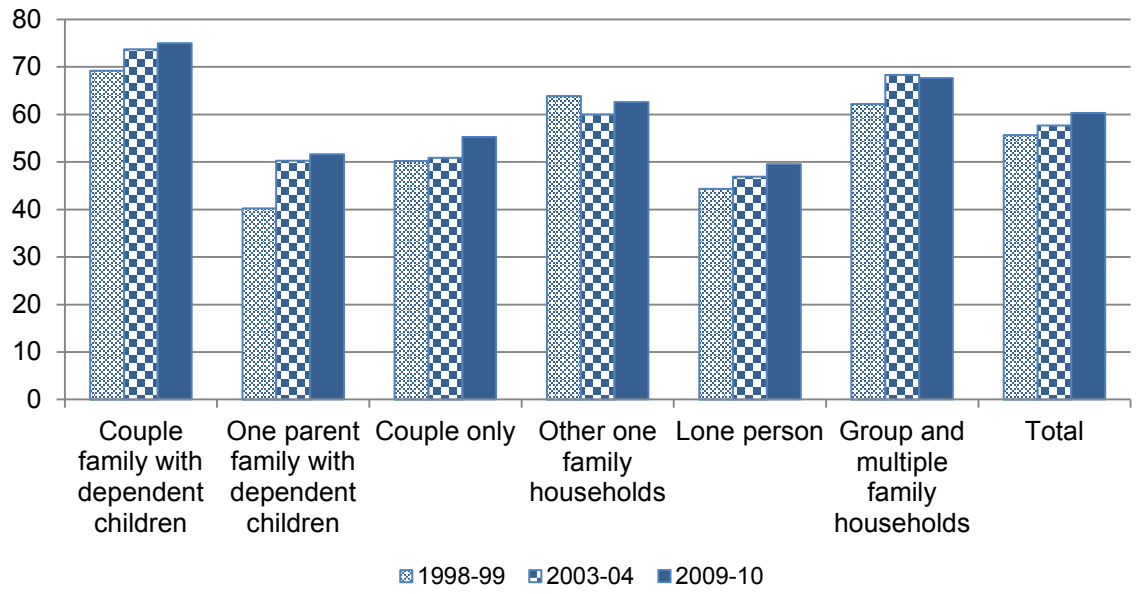
Year	*Households*	*Average persons working per household*	*Average employment rate per household*	*Average hours supplied per week per household*	*Average hours supplied per adult per week per household*
	No.	No.	%	Hrs	Hrs
1998-99	7 121 867	1.21	55.65	45.57	21.22
2003-04	7 735 818	1.23	57.68	45.99	22.12
2009-10	8 398 456	1.30	60.29	48.49	22.90

Source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Employment patterns within household types, however, have changed (figure 3.10). The largest increases in employment rates have occurred in households with dependent children — for both couple and one parent households employment rates rose by 6 and 11 percentage points respectively. Over the 2003-04 and 2009-10 period, employment rates in couple only and lone person households have also increased — each by around 5 percentage points.

Figure 3.10 **Household employment rates by household type[a], 1998-99 to 2009-10**

Percentage of working adults within households[b]



[a] Other one family households include households with one couple (or lone parent) and non-dependent children, one couple (or lone parent) with or without non-dependent children but with other relatives, one couple (or lone parent) with or without non-dependent children but or other relatives but with unrelated individual or two or more related individuals where the relationship is not a couple or parent-child relationship (for example, two sisters). [b] Percentage of working adults represents the average percentage of adults in a household who earn labour income.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Changes in employment also vary between different gross income deciles. In particular, much of the additional employment has come from households in the second to fourth gross income deciles (figure 3.11). Households in the top three deciles did not increase their already high levels of employment significantly over the period examined. Similarly, for households within these deciles, while hours worked have increased in absolute terms, the change is not significant.

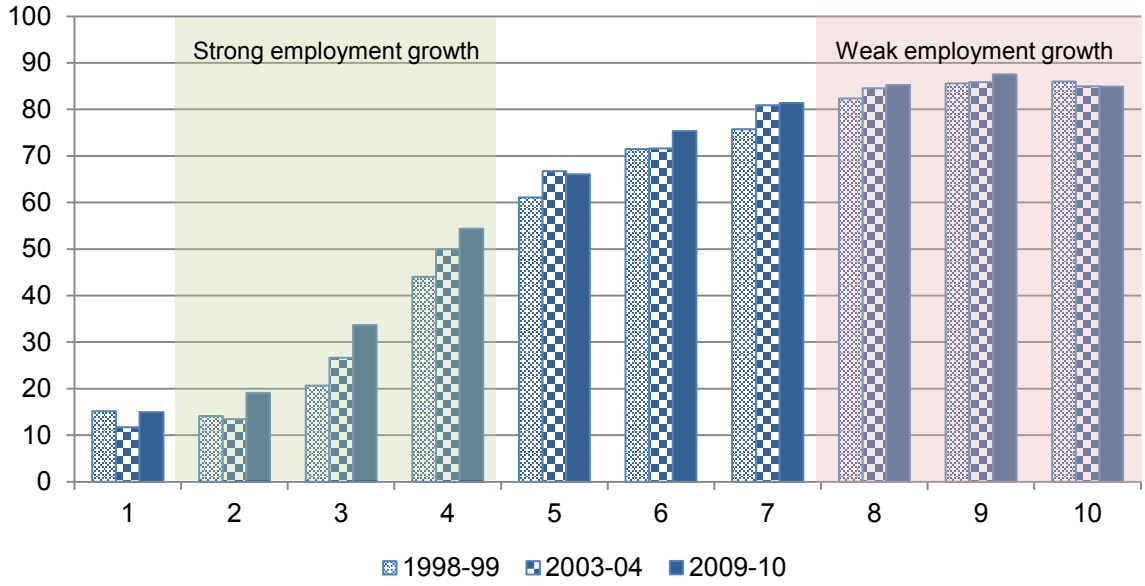
This suggests there are two underlying effects on household labour earnings:

- for low income households (deciles two to four), increased employment rates have increased labour earnings, which has flowed on to higher gross incomes
- for households with high incomes (top three deciles), higher labour earnings appear to be driven primarily by higher wages rates.

This differential effect can be seen by examining the correlation between changes in labour income to changes in employment rates and labour hours supplied. For lower deciles, the correlation is strong, for higher deciles it is very weak (figure 3.12).

Figure 3.11 **Household employment rates by gross household income deciles, 1998-99 to 2009-10**

Percentage of working adults within households[a]

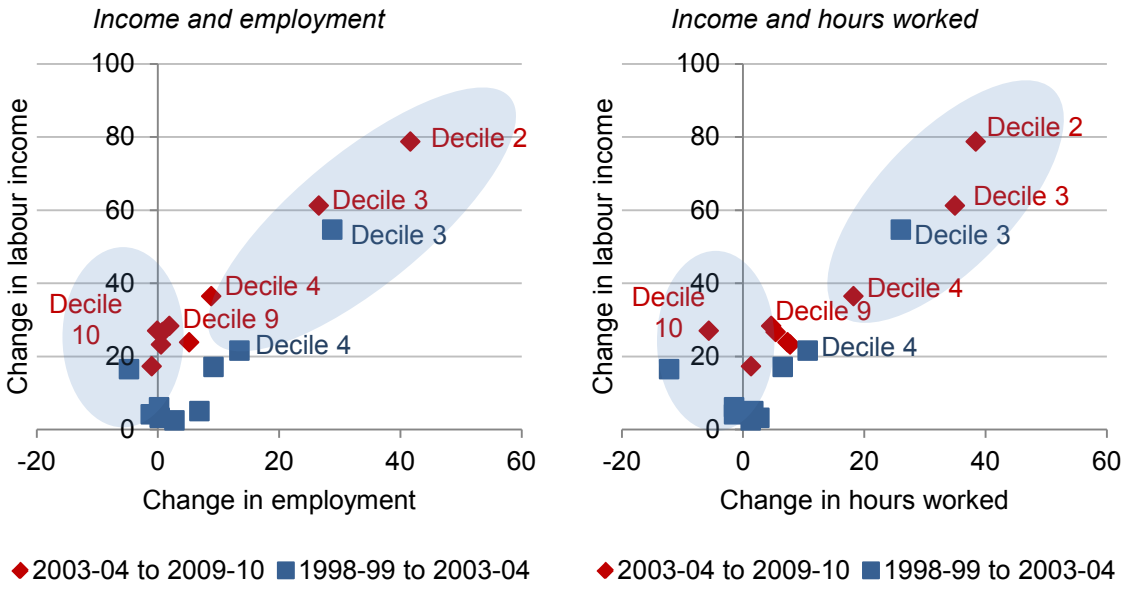


[a] Represents the average percentage of adults in a household who earn labour income.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Figure 3.12 **Correlation of changes in labour income, employment rates and hours worked by income decile, 1998-99 to 2009-10**

Percentage change



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

The different contribution of these proximate factors for different income deciles is also seen when changes in the dispersion of labour earnings are examined. Changes in the Gini coefficient show declining inequality in labour earnings for all households more generally (which also include retirees, unemployed households and people with disabilities living alone) from 1998-99 to 2009-10 (table 3.3). This is consistent with greater workforce participation and employment by households who previously did not supply labour, or supplied only limited amounts of labour. As these households move from zero to positive earnings, all else being equal, measured inequality will fall.

Table 3.3 **Gini coefficient estimates for household labour earnings, 1988-89 to 2009-10**

Gini coefficient

	All households	*Those with non-zero labour earnings*[a]	*Those with non-zero employee earnings*
1988-89	0.517	0.323	0.311
1993-94	0.569	0.366	0.347
1998-99	0.572	0.372	0.350
2003-04	0.556	0.358	0.347
2009-10	0.553	0.382	0.373

[a] Labour earnings include returns from own unincorporated businesses.

Source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

However, when only those households which earn labour income are considered (those with non-zero labour earnings), measured inequality increases over the 1998-99 to 2009-10 period — most notably between 2003-04 and 2009-10. This is consistent with a greater spread in hourly wages for those employed in the workforce as a result of real wages rising faster for those households in the top deciles compared with those received by households in lower deciles. And, while those in the lower deciles have increased hours, this was not enough to offset the effect of the growing wage differential. As a result, the overall spread in incomes of working households has widened.

For households in the upper middle deciles (five through to seven) the driving force is less clear. The two effects appear to be mixed — between 1998-99 and 2003-04 employment increased, whereas in the latter period, the wage effect appears to dominate. For these households, such a shift might be indicative of greater workforce attachment of a skilled second earner, particularly from households with dependent children, which has allowed households to benefits from increases in

skilled wages over time (these employment and wage effects have been seen at the individual level for part-time workers — chapter 2).

The distribution of capital & other income has become increasingly spread

Apart from employee earnings and returns from own unincorporated businesses, households also receive income from other market sources. Labelled capital & other income, this includes:

- net investment income made up of interest, rent, dividends and royalties including that from superannuation (capital income)
- private transfers made up of income from workers' compensation, scholarships, child support and other private sources (other income).

The estimates here exclude one important 'in-kind' source of market income, that which is derived from the services from the household's own home — known as 'imputed rent'. Imputed rent estimates exist and can be included in market income (box 3.3) but have not been used for this study as time series data are not available.

The distribution of capital & other income has a high level of dispersion. The majority of households earn little to no income from these sources, with a few households earning significant amounts (figure 3.13, left panel). For example, in 2009-10, 65 per cent of all households earned less than $50 per week from capital & other income. For the majority of households there has been little change in capital & other income. As a result, this source of income has not contributed greatly to the observed changes in the distribution of gross household incomes — that is, the shift to the right and flattening of the gross income distribution.

However, while capital & other income has not explained the broad distributional shifts seen in gross income, it has played a material role in the increase in measured inequality in gross income between 2003-04 and 2009-10.

The distribution of capital & other income has high measured inequality, with a Gini coefficient of around 0.980 in 2009-10. Since 1988-89 this has increased, predominantly due to increases in maximum incomes. The upper tail has become significantly longer, increasing in real terms from a maximum of around $12 000 per week in 1988-89 to around $68 000 in 2009-10. The median capital & other income has fallen over this period for $8 to $5 per week.

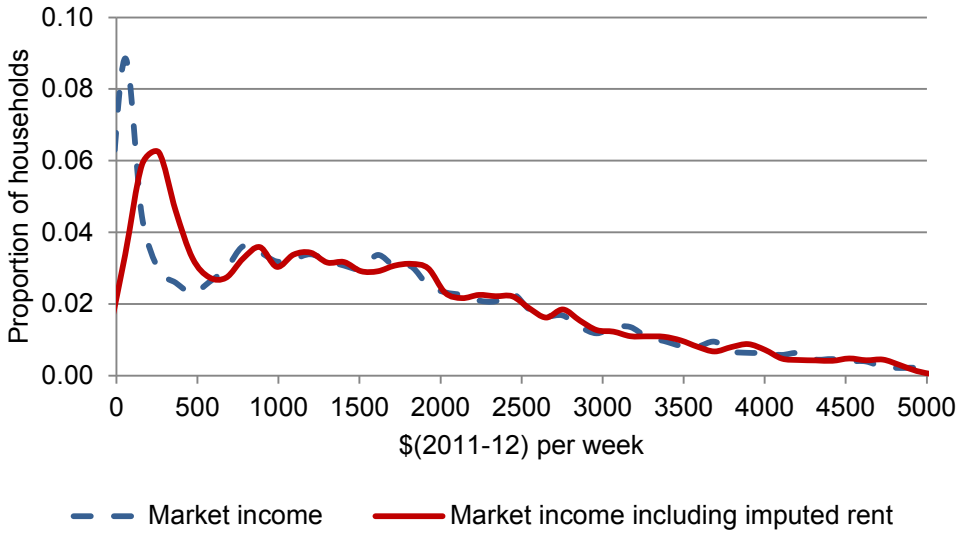
The higher amounts of capital & other income earnings seen in 2009-10 compared with earlier years have accrued predominantly to households in the 10th gross

income decile — with average capital & other income more than doubling between 2003-04 and 2009-10 (figure 3.13, right panel). This has effectively increased the spread of incomes between households in the 10th decile compared to those in lower deciles and resulted in the increase observed in the gross income Gini coefficient.

Box 3.3 Imputed private rent — a significant income source for some

The 2009-10 Household Expenditure Survey includes data on net imputed private rent. Imputed rent represents the value to the household of the accommodation they own and currently live in, or the value of private rental support. For those who own their own home or have their rent privately subsidised, weekly income can be adjusted by the amount they would have paid to live in their residence if they were paying market rent for the property. In other words, it represents the stream of implicit income the household earns from its ownership of the residence it occupies or the value of the private rental support it receives.

The imputed income stream from living in a fully owned residence is potentially significant for some — for example, those whose income consists primarily of the Age Pension but who own their home. When estimates of net imputed rent are included in market income, the shape of the distribution and its dispersion change significantly (see below). In 2009-10, the Gini coefficient of market income excluding net imputed rent was 0.522, when net imputed rent is included it falls to 0.488.



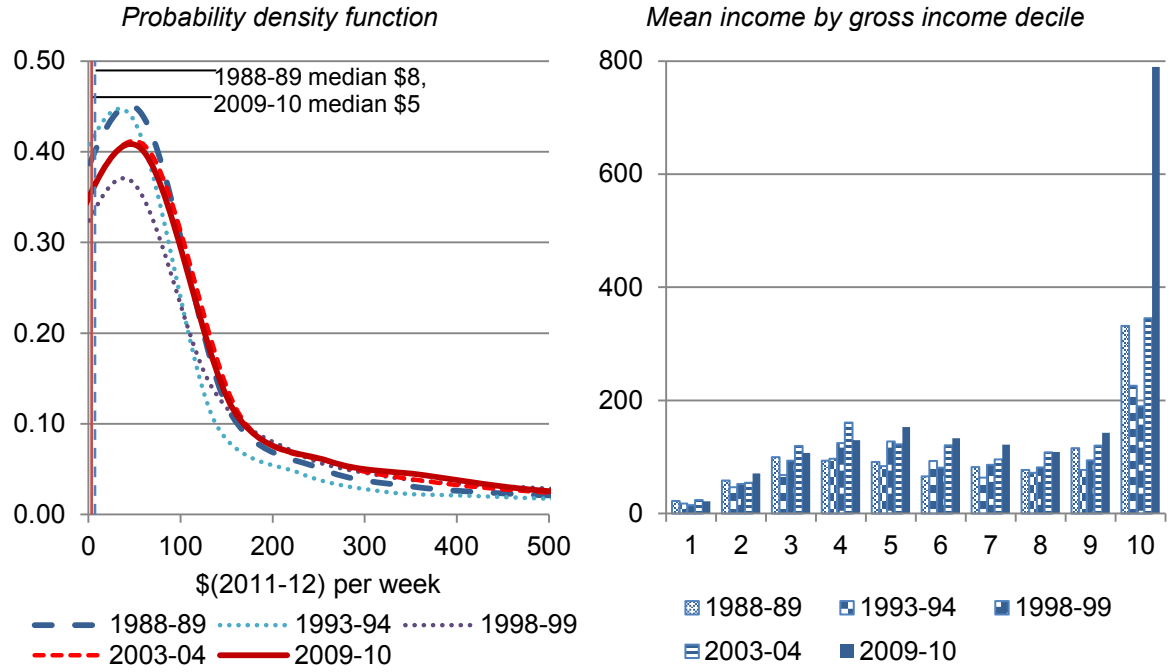
As can be inferred from the distributions above, the inclusion of net imputed private rent is most significant for those on lower incomes (in proportional terms). For households in the lowest gross income decile, for example, average market income in 2009-10 (all non-government sources) increases from $33 per week to $164 per week with the inclusion of net imputed rent.

Due to a lack of time series data, estimates of market income in this study do not include adjustments for imputed rent.

The impact of capital & other income on inequality in gross income can be illustrated by examining the difference between trends in labour income inequality and that seen in market income (labour income plus capital & other income). For all households, while labour earnings inequality has eased from 0.556 in 2003-04 to 0.553 in 2009-10, for market income it rose from 0.508 to 0.522. While much of the increase in the market income Gini coefficient is due to the lengthening of the upper tail — around 47 per cent — it does not account for all the rise in inequality.[4] This suggests that capital & other income's small contribution to the flattening of the middle of the distribution has also played a role.

Figure 3.13 **Distribution of household capital & other income, 1988-89 to 2009-10**

Proportion of households, mean income by gross income decile[a]



[a] For presentation purposes only the income range between $0 and $500 shown. Capital & other household incomes greater than $500 are present in the data.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

4 This estimate was obtained by recalculating the Gini coefficient when market incomes greater than those seen in 2003-04 were excluded — excluding 0.1 per cent of households.

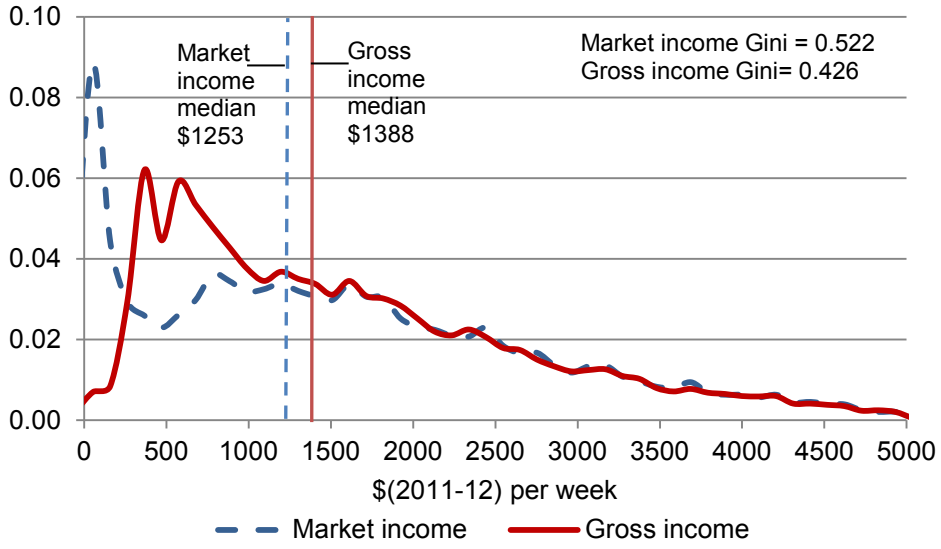
Direct government payments mainly benefit low income groups

Direct government payments in the form of pensions and allowances are the third component of gross household income. These include pensions and allowances for:

- the aged, disabled, unemployed, sick, students, veterans or their survivors
- families and children including Family Tax Benefits, the Baby Bonus and the Child Disability Assistance Payment paid to recipients of Carer Allowance.

Direct government payments have a significant equalising effect on the distribution of income (figure 3.14). Gini coefficient estimates of inequality fall from 0.522 for market income in 2009-10 to 0.426 when direct government benefits are included.

Figure 3.14 **The distribution market and gross household income, 2009-10**
Proportion of households[a]



[a] For presentation purposes only the income range between $0 and $5000 shown. Negative and incomes greater than $5000 are present in the data.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Since 1988-89, the distribution of direct government payments has changed. There has been a reduction in the proportion of households receiving direct payments, but for those which do, a higher share receive larger payments (figure 3.15, left panel).

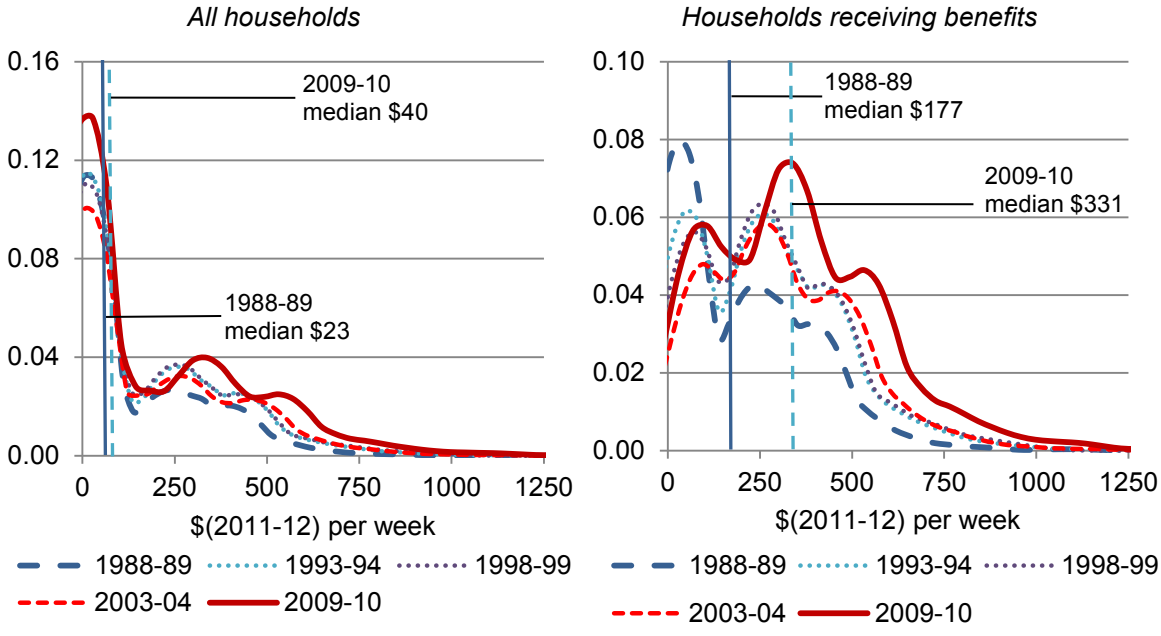
When only recipient households are considered (figure 3.15, right panel), considerable structural change in the distribution of direct government payments is observed between 1988-89 and later years. From the mid-1980s to mid-1990s, there was considerable change in Australia's social security system. Changes targeted low income families and women in response to the *Social Security Review* which was

established in 1986 (Henry Tax Review 2008). The resulting changes, as summarised by the Henry Tax Review (2008, p. 196-7), included:

- restructuring of payments to low income families with children to encourage workforce participation
- the introduction of family payment 'benchmarks' which represented the level of assistance required by a couple without market income to raise a child and achieve a similar living standard as a couple without a child
- increased Age Pension age for women and phasing out of dependency payments (taking effect in the 2000s)
- increased use of 'activity tests'.

Figure 3.15 **Distribution of household direct government benefits, 1988-89 to 2009-10**

Proportion of households[a]



[a] For presentation purposes only the income range between $0 and $1250 shown. Direct benefits greater than $1250 exist in the data.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Since 1993-94, government benefits have progressively increased in real terms — from an average of around $157 to just over $185 per week. For recipient households the change is starker — from $266 to $346 per week. The most significant increases have been for those households in the first five gross income deciles (table 3.4). The increases have been concentrated in the bottom four deciles (and are particularly large in the 1st and 2nd deciles).

Despite the increases in payment value for recipient households, the impact of direct government benefits on the Gini coefficient has lessened over time. The difference in the Gini coefficient between the distribution of market income and that of gross income has fallen from 0.122 in 1993-94 to 0.096 in 2009-10. This result, however, is likely to have been due to a fall in benefit recipient rates with higher rates of employment rather than anything related to the effectiveness or targeting of benefit payments.

Table 3.4 **Contribution of direct government benefits to changes in gross household income by decile, 1988-89 to 2009-10**

Per cent

Decile	*1988-89 to 1993-94*	*1993-94 to 1998-99*	*1998-99 to 2003-04*	*2003-04 to 2009-10*
	%	%	%	%
1	17	60	30	64
2	46	68	79	33
3	37	21	7	28
4	38	29	23	17
5	31	13	4	20
6	20	1	8	3
7	27	3	20	0
8	19	1	13	1
9	6	1	12	2
10	0	3	3	0
Average	24	20	20	17

Source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

For households in the bottom four deciles, much of the growth in gross income due to increases in direct government benefits has been largely a consequence of increases in the real value of the Age Pension. Approximately 40 per cent (in each survey) of those in the bottom three deciles report that their main source of government direct benefits is the Age Pension. The real value of the Age Pension rose by 10 per cent for singles and 8 per cent for couples between 1998 and 2004 and by 30 and 15 per cent, respectively, between 2003 and 2010.

3.3 The contribution of taxes and indirect transfers to the distribution of household incomes

Governments levy direct taxes on income progressively, with taxation rates increasing as assessed income increases. Tax collections are used to fund a range of government services and also fund the direct payments discussed in the previous section. Governments also levy a number of indirect taxes.

Government provided services, such as subsidised health care and education, can be viewed as transfers in-kind (and therefore as part of income). The ABS defines indirect transfers, or 'social transfers in-kind' as:

> Non-cash benefits and services provided by the government to households for education, health, housing, social security and welfare, and electricity concessions and rebates. It includes reimbursements of approved expenditures such as the Medicare rebate, the Private Health Insurance Rebate, the Child Care Benefit and the Child Care Rebate. The cost of administering the provision of social assistance benefits in cash is included. (ABS 2012a, p. 165)

Many in-kind services represent the delivery of services including those under universal insurance schemes (such as health care). As such, they are not specifically designed as redistributive policies and would be expected to accrue more evenly across income deciles. That said, the delivery of these services can have a redistributive element.

The combined effects of indirect government transfers and taxation (direct and indirect) on gross household income are measured in 'final household income'. Final, or adjusted household income represents the most comprehensive accounting of household income (chapter 1).

Direct taxes (measured by disposable household income) and the additional impact of indirect taxes and transfers (measured by final household income) have an equalising impact on the distribution of income (figure 3.16, top panel). This is a result of two factors:

- those with higher incomes are generally subject to higher rates of income tax
- in-kind services make up a higher share of final income for those in lower income deciles (figure 3.17).

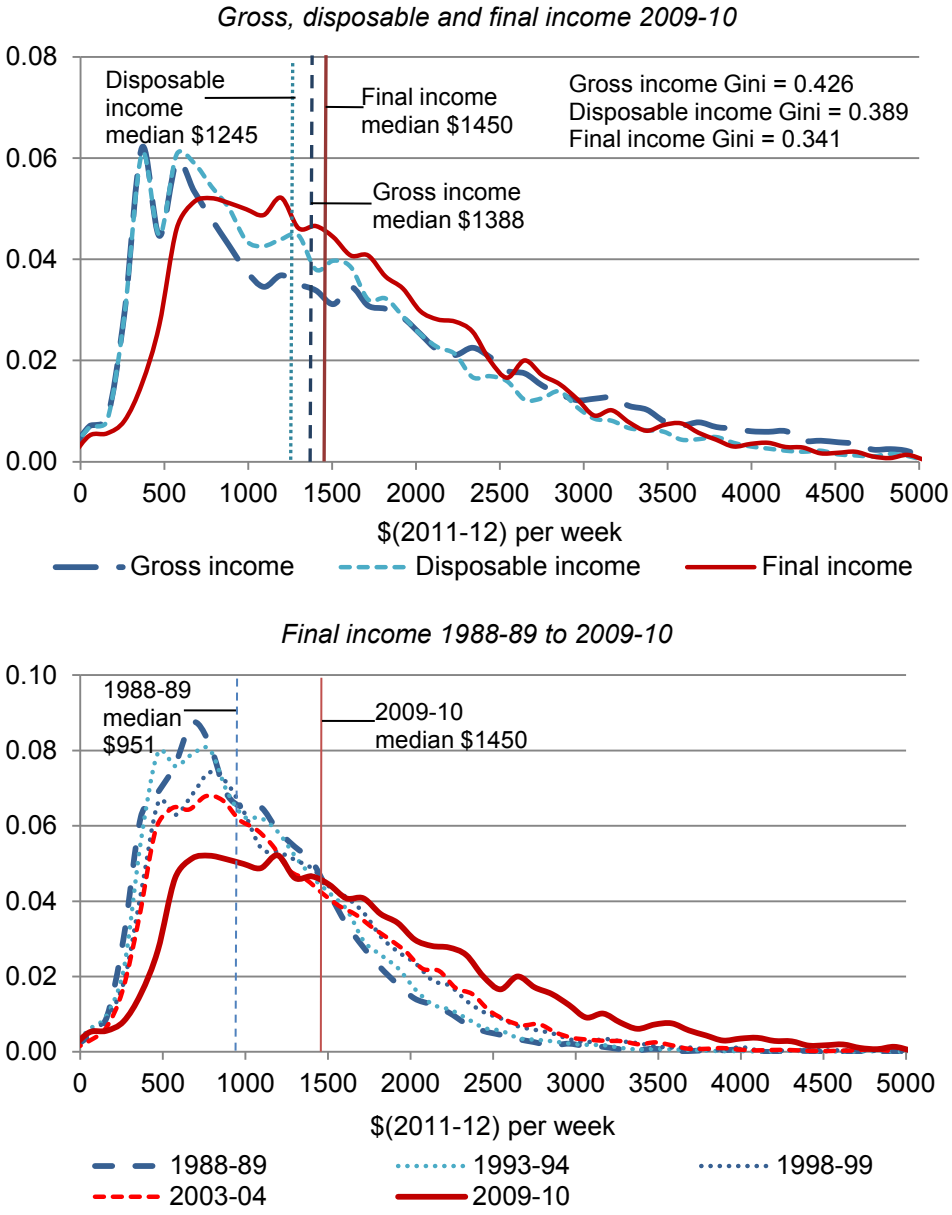
These influences progressively narrow the distribution of income and reduce its overall spread. Measured by the Gini coefficient, inequality in household income in 2009-10 declines from 0.426 for gross income, to 0.389 for disposable income to 0.341 for final income.

Over the past 20 years, the trends in final household incomes have mirrored those observed in gross household incomes — a shifting to the right and flattening of the distribution (figure 3.16, bottom panel).

While changes in labour incomes, capital & other income and direct government benefits explain much of the changes in the distribution of household income (discussed above), changes in taxes and indirect benefits have also played a role. These effects are explored below.

Figure 3.16 **Distribution of household gross, disposable and final weekly income**

Proportion of households[a]

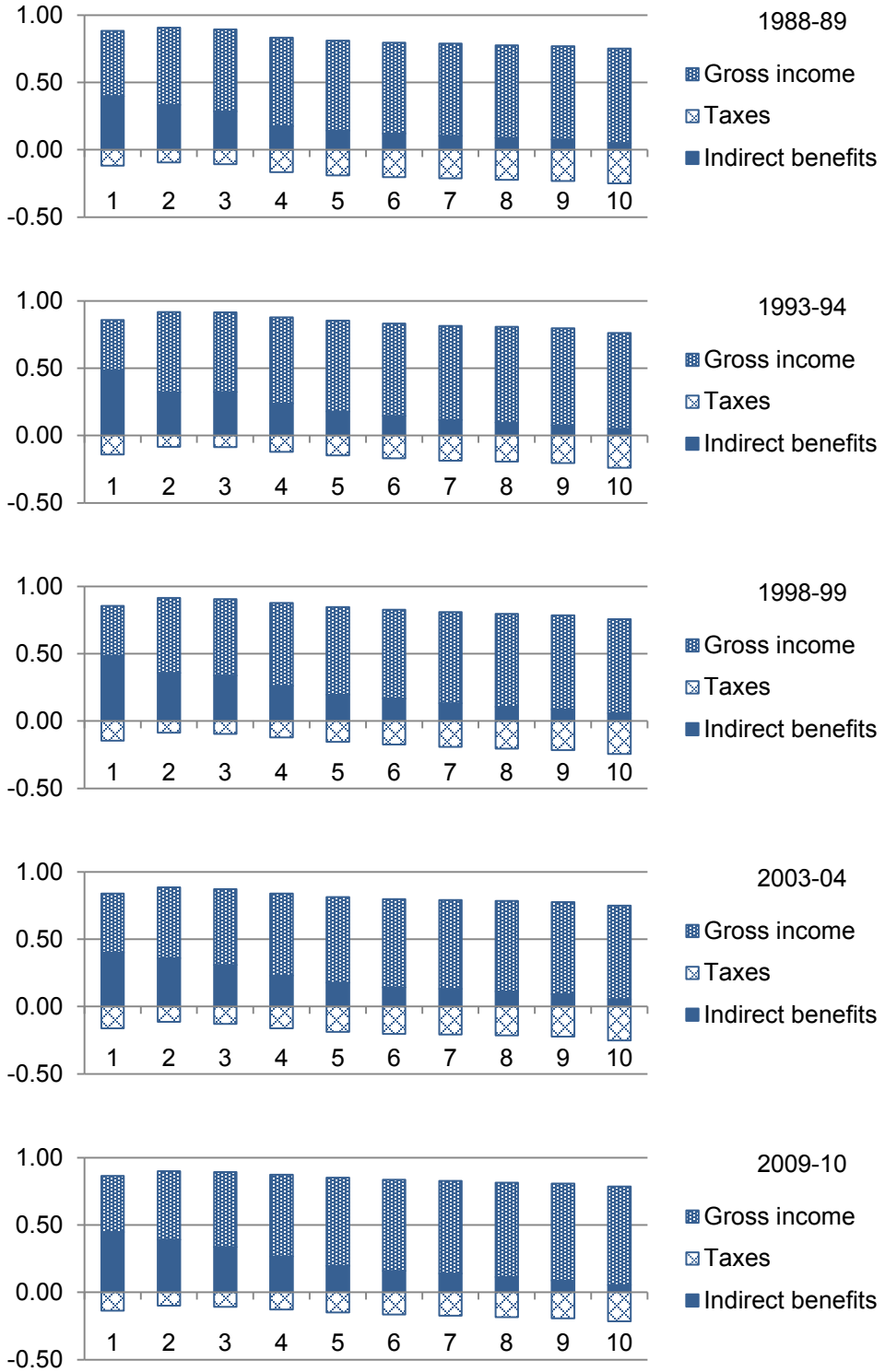


[a] For presentation purposes only the income range between $0 and $5000 are shown. Negative and household incomes greater than $5000 are present in the data.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Figure 3.17 **Components of final household income by decile, 1988-89 to 2009-10**

Proportion of final household income, 1 lowest decile, 10 highest



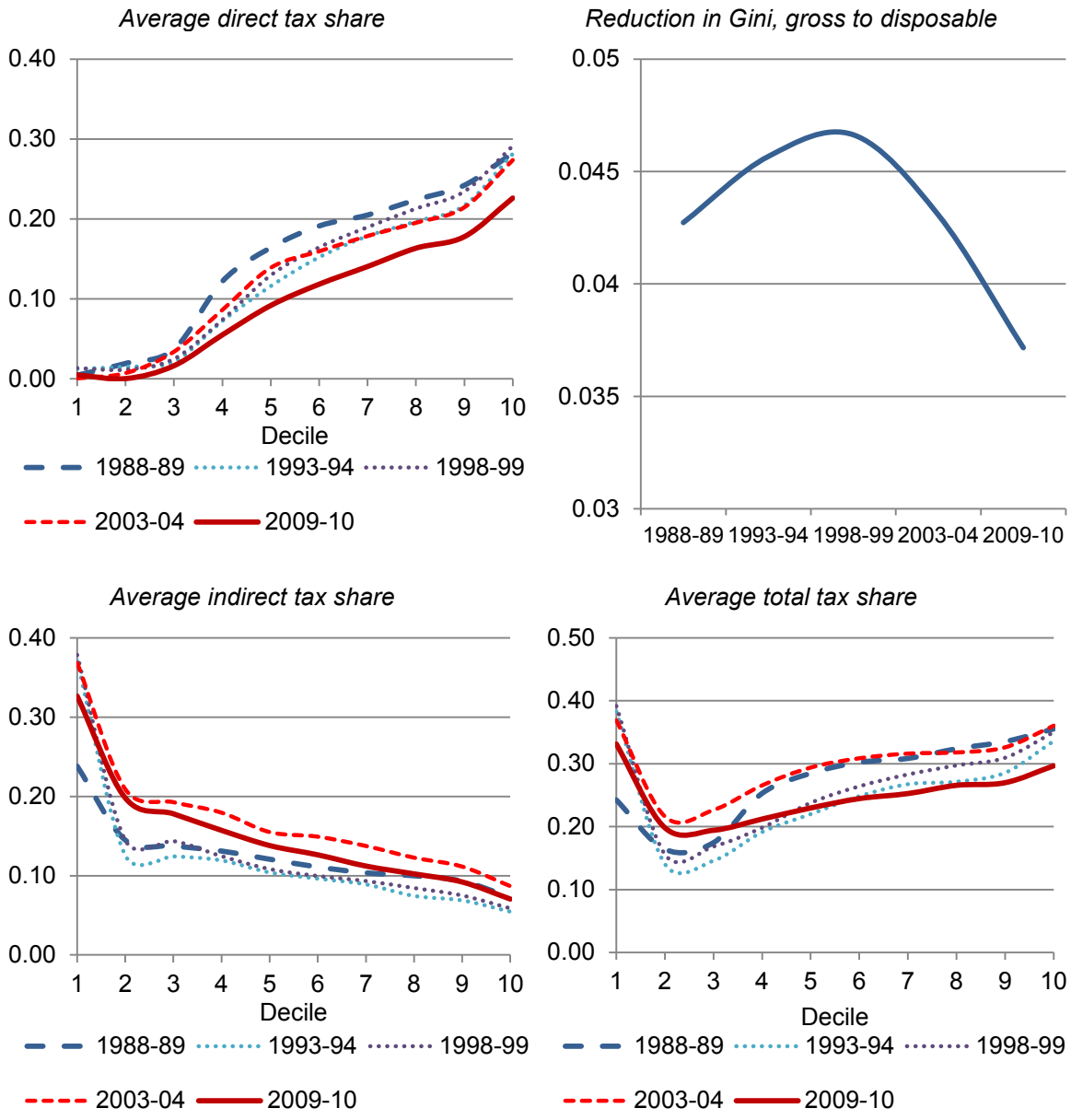
Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Direct and indirect taxes

The effect of taxes on the distribution of income has changed over the period 1988-89 to 2009-10. On balance, those with higher incomes are subject to higher average tax rates. For direct taxes, the progressive nature is clear across gross income deciles (figure 3.18, top left panel).

Figure 3.18 **Average tax shares by gross income decile and impact on the Gini coefficient, 1988-89 to 2009-10**

Proportion of gross income, Gini coefficient



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Since 1988-89, however, average direct tax shares have fallen, with the largest falls seen for those with higher incomes (this has been observed by other researchers such as Whiteford (2012)). This has resulted in a reduction in the equalising impact of direct taxes on the distribution of gross household incomes. The difference in the Gini coefficient between gross and disposable income has fallen since 1998-99 from 0.047 to 0.037 (figure 3.18, top right panel).

In contrast to direct taxes, indirect tax shares of gross income for households in lower deciles are higher than for those in higher deciles (figure 3.18, bottom left panel). Whilst data for the 1st decile are subject to some ambiguity in interpretation (due to factors such as own unincorporated businesses losses leading to negative incomes and some low income earnings drawing on savings) as significant differences exist between reported income (used to calculate the decile ranges) and expenditures (used to calculate indirect taxes), there is a clear regressive pattern in average indirect tax rates from the 2nd to 10th decile.[5] This is primarily due to higher expenditure to income ratios in lower deciles, with households in higher deciles paying proportionally lower amounts of indirect taxes relative to their incomes because they save more.

Overall, excluding the 1st decile, the combined average total tax rates show those in higher deciles pay higher taxes. The changes to the tax system since 1988-89 have reduced the overall progressivity of the tax take, with the share of income paid as taxes falling for those in 4th and higher deciles, but rising for those in the second and third decile (figure 3.18, bottom right panel).

Indirect benefits

The majority of indirect transfers by Australian governments relate to health and education. Combined, these accounted for over 83 per cent of total indirect benefits in 2009-10. Childcare benefits accounted for around 2 per cent of total benefits in 2009-10 with the remaining 15 per cent made up of other social security and welfare benefits, housing benefits and electricity concessions.

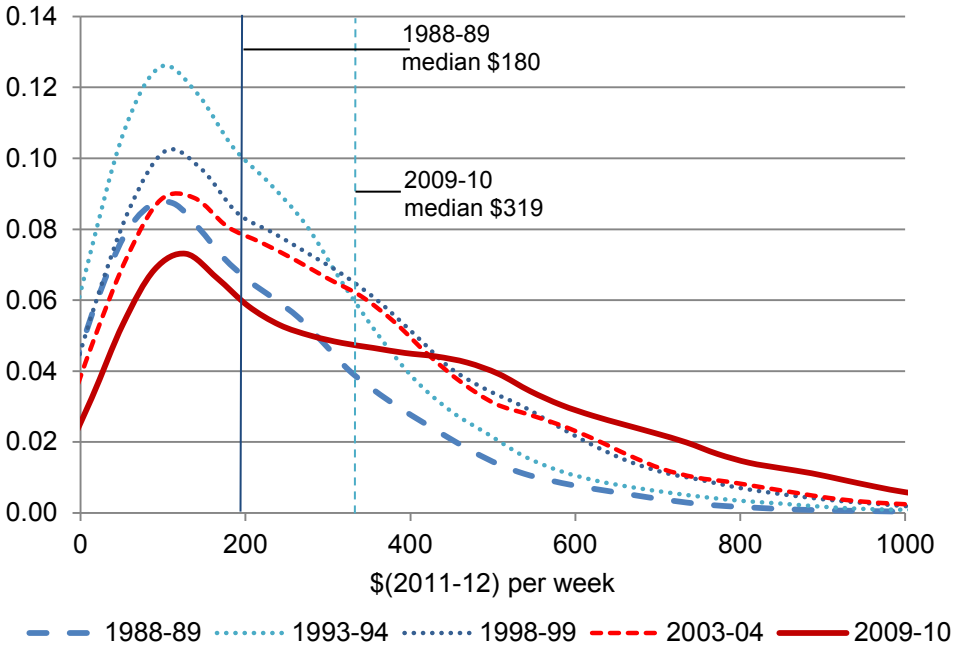
Since 1988-89, the distribution of indirect benefits has changed (figure 3.19). There has been a significant increase in the real value of indirect benefits accruing to households over time, and in particular over recent periods — by 27 per cent from 2003-04 to 2009-10. The recent change has benefited households across all gross

5 This is further complicated by inter-temporal consumption smoothing. Consumption in any given period is influenced by borrowing and saving decisions, thereby distorting the calculation of tax shares.

income deciles, with largest increases seen in the bottom four deciles. Consistent with this, the equalising impact of indirect transfers has increased over time. The difference between the Gini coefficient for gross income and gross income including indirect benefits (that is, the amount that indirect benefits reduce the gross income Gini coefficient) has risen from 0.046 in 1988-89 to 0.063 in 2009-10.

Figure 3.19 **Distribution of household indirect government benefits, 1988-89 to 2009-10**

Proportion of households[a]



[a] For presentation purposes only the income range between $0 and $1000 shown. Indirect benefits greater than $1000 are present in the data.

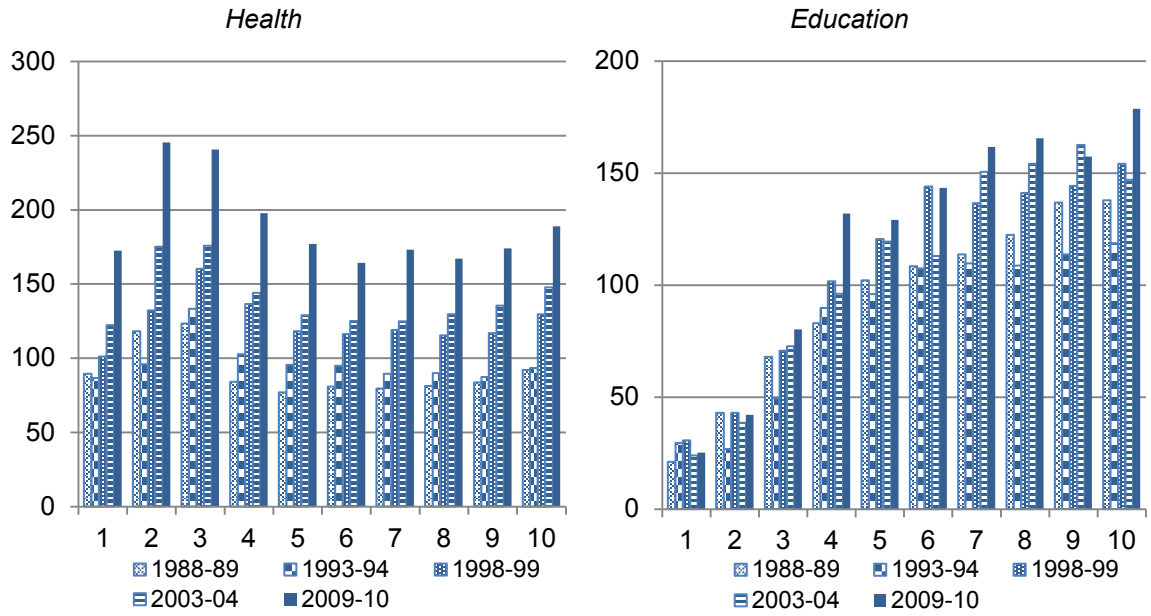
Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Much of the observed change between 1988-89 and 2009-10 is driven by increases in health benefits. Real health benefits have increased from an average of $91 per week per household in 1988-89 to $190 per week per household in 2009-10, with the share of indirect health benefits in total indirect benefits increasing from 43 to 51 per cent (however, it should be noted that price inflation for health services exceeded general inflation rates during much of this period). For education, while its relative importance for indirect benefits has fallen, from 44 per cent in 1988-89 to 32 per cent in 2009-10, the real value of benefits received per household has increased from $94 per week per household to $122 per week per household over the period.

The effect of in-kind health and education services varies across gross income deciles. Primarily, the differences observed relate to the household composition of each decile. Health benefits accrue to a greater extent to those in the 2nd and 3rd deciles (figure 3.20, left panel) as these deciles have the highest share of non-working age households. Conversely, education benefits accrue to a greater extent to households in higher income deciles (figure 3.20, right panel) as these have a higher proportion of households with dependent children.

Figure 3.20 **Value of indirect health and education benefits by gross income decile, 1988-89 to 2009-10**

2011-12 dollars, 1 lowest decile, 10 highest



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Contributions to measured final household income inequality

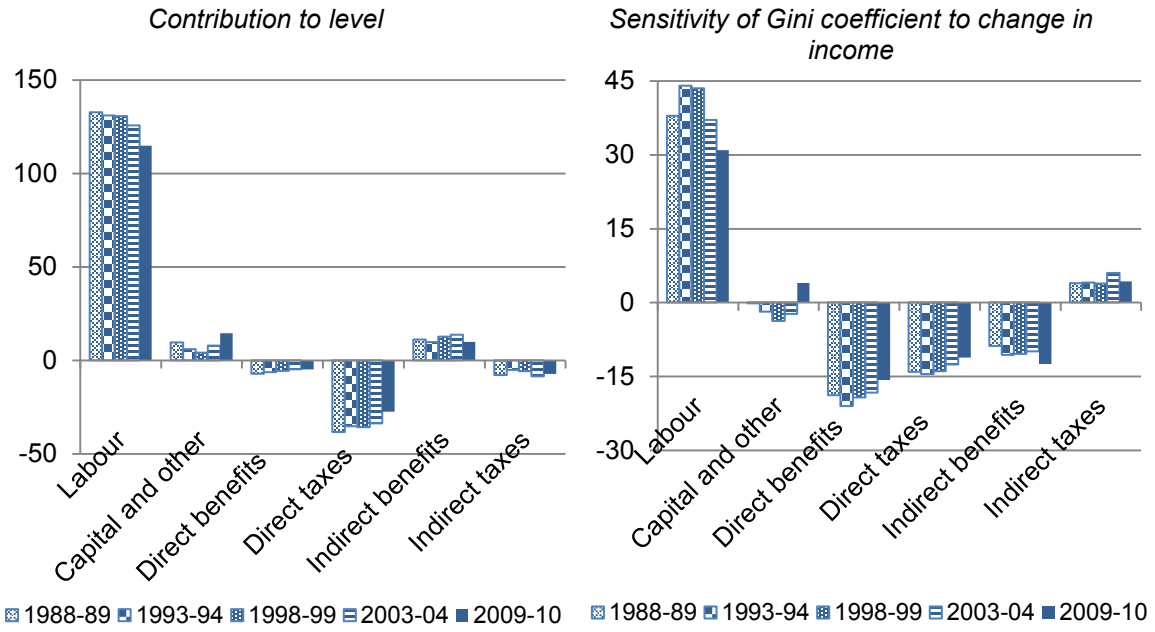
The key income elements that explain the Gini coefficient estimate for final income are summarised in figure 3.21 (left panel). Labour income, given its share, accounts for the majority of the observed level of final income inequality, but this impact has lessened over time. Direct benefits and direct taxes reduce the final income Gini coefficient — that is they reduce income inequality.

Interestingly, indirect benefits contribute positively to the observed level of final income inequality, while indirect taxes appear to decrease final income inequality. However, the full picture requires the examination of the sensitivity estimates (figure 3.21, right panel). (Sensitivity estimates represent the percentage change in

the final income Gini coefficient that would result from a 1 per cent change in income of an income source given the level of income and its distribution and ignoring any second round effects.) As discussed above, the sensitivity estimates cannot be generalised into any policy evaluation as the estimates ignore any consideration of where the income would come from (for example, increased direct government benefits would require higher taxes) or any second round effects from changes in income (continuing the example, any responses from households who receive the higher benefits or those who pay higher taxes). They only show the relative sensitivities of the Gini coefficient estimate to each income source examined, all else given.

Figure 3.21 **Income source contribution to the final household income Gini coefficient and its sensitivity, 1988-89 to 2009-10**

Per cent



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Both the sensitivity estimates for indirect benefits and indirect taxes have opposite signs to the contribution effects.

For indirect benefits, because they have a *positive* correlation with final income (that is they are not targeted exclusively at those on lower incomes and do not phase out as income increases), they contribute to the observed level of final income inequality. However, as these account for a greater share of final income for those on in lower deciles, it means that they do not increase inequality. In fact, as discussed above, with rising levels of indirect benefits inequality would be expected to fall as seen in the sensitivity estimate.

For indirect taxes, because they are negatively correlated to final income (they are a tax), the percentage contribution to final income inequality is negative. However, because relative to final incomes indirect taxes are disproportionally paid by those on lower incomes, a 1 per cent increase in indirect taxes (given its distribution) would lead to an increase in final income inequality.

3.4 The impact of household composition and family formation on household income

To take account of household composition and family formation, household income is typically expressed on an 'equivalised' basis. This is done so that households of different types can be more readily compared. Equivalised measures are used to enable comparison of the relative economic resources available to households of different size and composition. For a lone person household, equivalised income is equal to the original value of income. For a household consisting of more than one person, the equivalised income is the level of income that would be needed by a lone person household to enjoy the same level of material living standards as the household in question (ABS 2012a).

Equivalised measures attempt to account for economies of scale associated with people living together as well as the extra cost burdens for households with dependents.[6]

However, there is no precise way to estimate the economies of scale and relative costs of household dependents — no 'right' scale exists. Moreover, as noted by Johnson and Wilkins (2006):

> Ultimately, the choice of equivalence scale is arbitrary, and the problem arises that the choice of scale is likely to alter inferences on changes to the distribution of income. (p. 16)

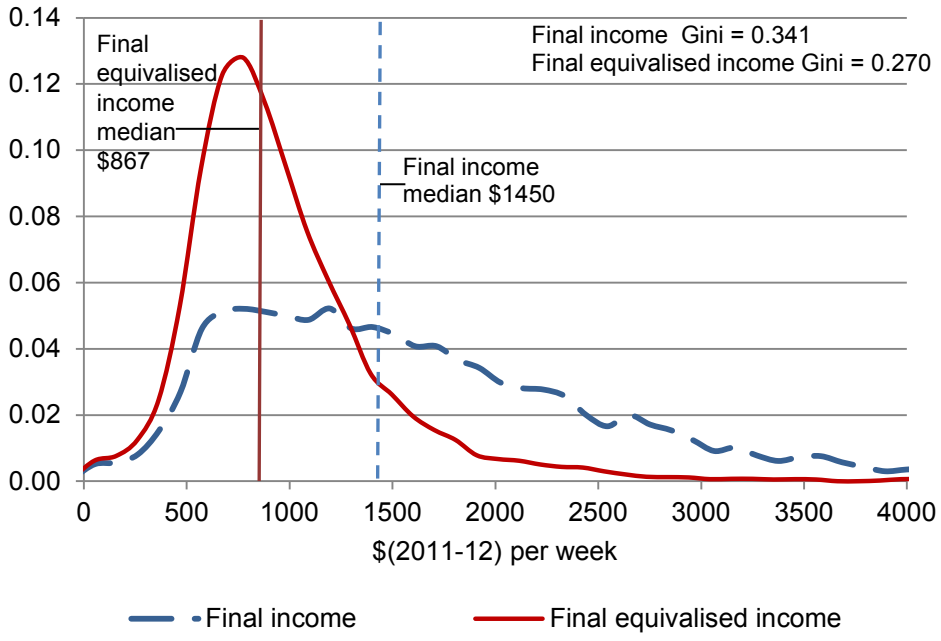
Indeed, the impact of income equivalisation on the dispersion of income can be seen in the shift from 'final' to 'final equivalised' income on figure 3.22. Applying this concept significantly reduces the variation of incomes. This arises as households with higher incomes tend to have more members, while households with lower

6 The approach in this study follows that of the ABS. The equivalising factor applied to household income is calculated using the 'modified OECD' equivalence scale. The equivalising factor is determined by applying a score of 1 to the first adult in the household, with each additional adult (those 15 years or older) allocated 0.5 points, and each child under the age of 15 allocated 0.3 points.

incomes tend to have fewer members. The Gini coefficient falls from 0.341 in 2009-10 for final income to 0.279 for equivalised final income.

Figure 3.22 **Distribution of household final and final equivalised income, 2009-10**

Proportion of households[a]



[a] For presentation purposes only the income range between $0 and $4000 shown. Negative and final household incomes greater than $4000 are present in the data.

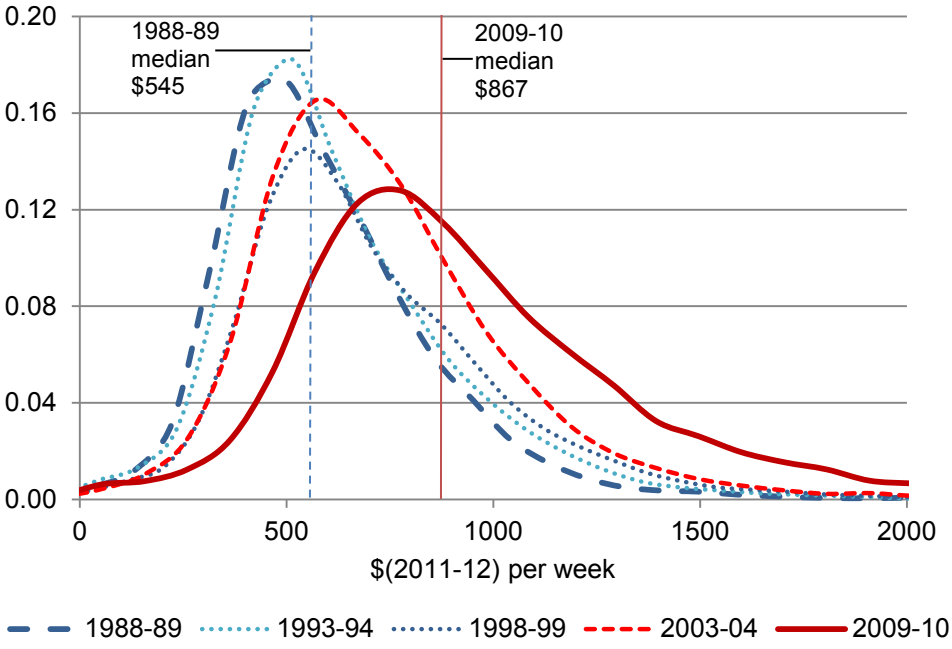
Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Shifts in the distribution of equivalised final household income reflect the same pattern of change as seen in other measures of household income described earlier in this chapter (figure 3.23). The distribution has progressively shifted to the right and become flatter since 1988-89. Again, as seen in other measures of household incomes, these shifts have resulted in a higher Gini coefficient, rising from 0.248 in 1988-89 to 0.270 in 2009-10. And while the lengthening of the upper tail in 2009-10 has contributed significantly to this, recalculating the Gini coefficient excluding those incomes in the upper tail which are higher than that seen in other surveys only reduces the Gini coefficient from 0.270 to 0.263.[7] This suggests that the majority of the change in income dispersion is due to the flattening of the distribution.

7 The top equivalised incomes in 2009-10 were excluded which reduced maximum incomes in 2009-10 to equivalent levels to those seen in other surveys — a maximum of around $6000 per week. Recalculating the Gini coefficient over this reduced sample resulted in an estimate of

Figure 3.23 **Distribution of household equivalised final income, 1988-89 to 2009-10**

Proportion of households[a]



[a] For presentation purposes only the income range between $0 and $2000 shown. Negative and final household incomes greater than $2000 are present in the data.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Changes in family formation are also part of the story

Changes in the ways in which households are formed, and their relative composition within a society, can also influence changes in the distribution of final equivalised income. As discussed earlier, household formation generally narrows the distribution of individual incomes as members within households combine incomes. However, the extent to which this occurs depends on the prevalence of different household types. For example, a shift towards a greater share of single person headed households (lone individuals or single parents) will reduce the narrowing influence of household formation on the distribution of income.

Changes in the share of different household types aside, even in societies where couple households dominate, the characteristics of the 'pairs' formed can play a role in changes in the distribution of income over time. The OECD (2011) highlighted

0.265 compared with 0.270 for the full sample. This represents 25 per cent of the change in the Gini coefficient from 1988-89 to 2009-10.

how changes in these characteristics of a population have contributed to observed trends in income distributions of OECD countries by exploring trends in:

- partnering — the degree to which couples are formed between individuals who have a high correlation of earnings (termed 'assortative mating', see box 3.4)
- household composition — changes in the proportion of single-headed and couple households.

Box 3.4 **How partnering decisions impact on the distribution of household earnings**

The tendency of individuals to have spouses with similar earnings levels has been termed assortative mating. The level of assortative mating, and changes over time, can influence the impact of household formation on the distribution of household incomes.

In instances of high rates of assortative mating, for a household where one earner is in a high (low) income decile, their spouse is also likely to earn an income in a high (low) decile. This leads to a concentration of high incomes in some households, and a concentration of low incomes in others. This means the spread in individual earnings is reinforced at the household level.

Conversely, where rates of assortative mating are low, it is likely that a high (low) income earner will have a spouse whose income is much lower (higher). In this instance, family formation has an offsetting impact on the spread of individual earnings, meaning that dispersion in household incomes is likely to be much lower than that observed at the individual level.

For Australia, partnering decisions and household composition have both helped to explain changes in the distribution of equivalised gross household earnings over the period from 1985 to 2003 (OECD 2011). In particular, both the increase in single-headed households and rise in degree of assortative mating within couple households contributed to rising levels of inequality in the distribution of equivalised gross household income.

Another lens through which to view household formation is to use labour market attachment. Researchers have found that in households where one partner is without a job, there is a higher chance that the other will also be without a job. Indeed, Australia has one of the highest rates of jobless households amongst OECD countries (Whiteford 2012). As such, changes in the proportion of jobless households help explain some of the observed trends in the distribution of labour and ultimately final income in Australia.

Estimating trends in partnering decisions is difficult

The apparent trend observed by the OECD (2011) in partnering decisions (or assortative mating rates) depends heavily on the approach taken. The OECD (2011) examined the proportion of assortative mates by examining couple households where both partners work. Assortative mates in the OECD analysis are those where a husband's earning decile (based on the distribution of male incomes) is the same (or within a defined range) as their wife's earning decile (based on the distribution of female earnings).

However, such an approach is sensitive to changes in workforce participation. This can influence the estimates of assortative mating observed in any given year and therefore inferences made about apparent trends. In particular, the OECD's approach has the potential to overstate changes in assortative mating in instances when household participation and employment rates are increasing over time and, in particular, where such increases are concentrated within certain deciles — as has been the case for Australia between 1988-89 and 2009-10. For example, higher participation tends to increase the proportion of couple households where both partners are working. If this occurs in groups with relatively high assortative mating then the rate of assortative mating may appear to rise as they are now captured within the statistics when in reality there has been no underlying change. Such a change can occur for a number of reasons, such as higher rates of return to work of a skilled second earner after children reach school age or due to greater access to childcare for children under five years of age.

An alternative approach to measuring changes in assortative mating is to include all couple households and examine labour incomes (including those not reporting income) with reference to the distribution of all labour incomes (including zero labour incomes of non-working partners). Applying this approach, if zero incomes are predictors of lower potential labour earnings, as participation increases there are likely to be fewer 'new' assortative mates found.

Noting the limitations in determining rates of assortative mating, the alternative approach was applied to examine possible changes since 1998-99. [8] Using a broad definition of assortative mating — partners who earn incomes within one decile of each other[9] — it was found that the proportion of working age couple households (both partners aged 15-65 years) where both partners earn in similar labour income

8 The analysis has focused on the period 1998-99 to 2009-10 as it was not possible to link individual earnings to household groups in the 1993-94 CURF.

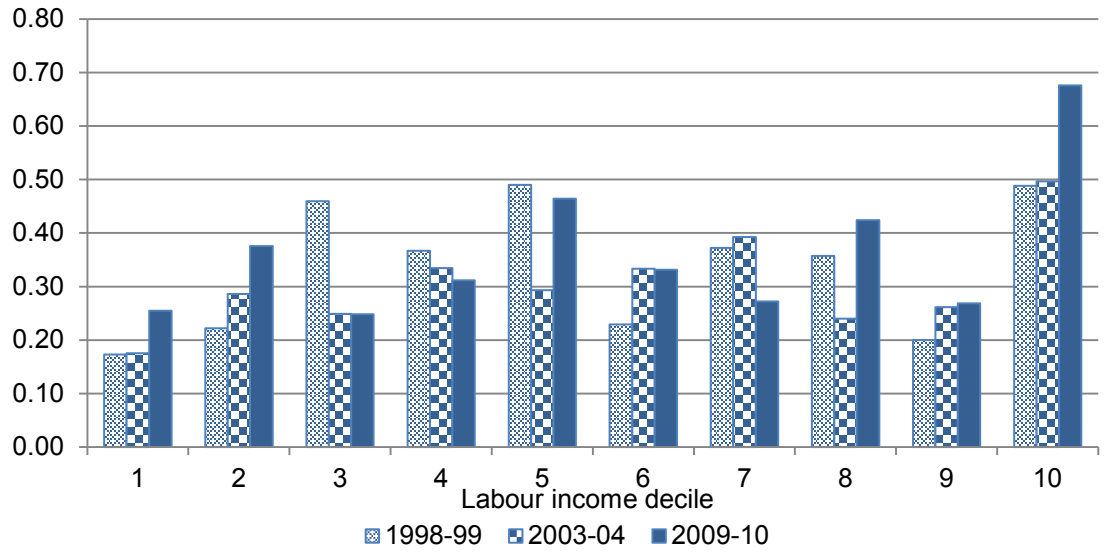
9 If one partner earns income within decile i, their partner is classified an assortative mate if their income falls within decile i-1, i or i+1.

deciles initially fell between 1998-99 and 2003-04 from 33 to 31 per cent, but increased thereafter (from 31 to 35 per cent between 2003-04 and 2009-10). However, some differences exist across households in different income deciles (figure 3.24).

Couple households where one partner's labour income is the highest decile are also more likely to have the other partner's income in the same decile — a trend that has increased over time. However, trends within other deciles are mostly inconsistent, with the exception of the bottom two and 9th deciles which, by this measure, have also seen increases in rates of assortative mating.

Figure 3.24 **Assortative mating rates, 1998-99 to 2009-10**

Proportion of couple households with partners earning similar amounts, 1 lowest decile, 10 highest



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Household composition shares have stabilised

Compared to the OECD's period of analysis, over more recent periods household composition has been relatively stable (table 3.5). The proportions of households within broad categories have remained relatively stable between 2003-04 and 2009-10.

Table 3.5 **Household structure, 1998-99 to 2009-10**
Per cent of all households

Household structure	*1998-99*	*2003-04*	*2009-10*
	%	%	%
Couple with dependent children	23	27	26
Couple only	25	26	26
Other one family households	14	10	12
One parent family with dependent children	5	7	6
Lone person	24	25	24
Group and multiple family households	9	4	5

Source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Indeed, the proportion of single-headed households — the focus of the OECD's analysis — has fallen slightly from 32 per cent in 2003-04 to 30 per cent in 2009-10. This suggests that household formation has played a much lesser role in the recent changes in Australia's distribution of household income than previously.

And the proportion of jobless households has fallen

The proportion of working age households in which no adult occupant had a job (jobless household)[10] fell between 1993-94 and 2009-10 (table 3.6). This change is consistent with increases in employment rates where members of previously jobless households have shifted into paid work over time. This change, resulting in a shift from social security payments to labour income, is likely to have contributed to the shift to the right observed in the distribution of gross and final household incomes, particularly between 2003-04 and 2009-10.

10 A working age household is defined as one where the age of the household reference person is below 65 years.

Table 3.6 **Jobless households, 1988-89 to 2009-10**

Per cent of all households[a]

	Working age households		*Non-working age households*	
Year	*Share*	*Equivalised final income gap*	*Share*	*Equivalised final income gap*
	%	%	%	%
1988-89	12.8	39.8	15.6	20.6
1993-94	14.4	38.0	16.9	19.1
1998-99	14.3	38.1	16.9	21.7
2003-04	13.3	38.3	17.4	18.6
2009-10	11.0	39.9	16.6	22.1

[a] Income gap represents the difference between average incomes for jobless households and those of all households expressed as a per cent of average incomes for all households. That is, on average, how much lower incomes for jobless households are compared to the average household.

Source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

However, the income gap between the remaining jobless households to all households has increased. Based on equivalised final income, between 2003-04 and 2009-10, the income gap between average equivalised final household income of jobless working age households and average equivalised final income of all households rose from 38.3 to 39.9 per cent. A similar result is seen for non-working age households between 2003-04 and 2009-10 in terms of equivalised final income gaps; however the income gap is considerably lower.

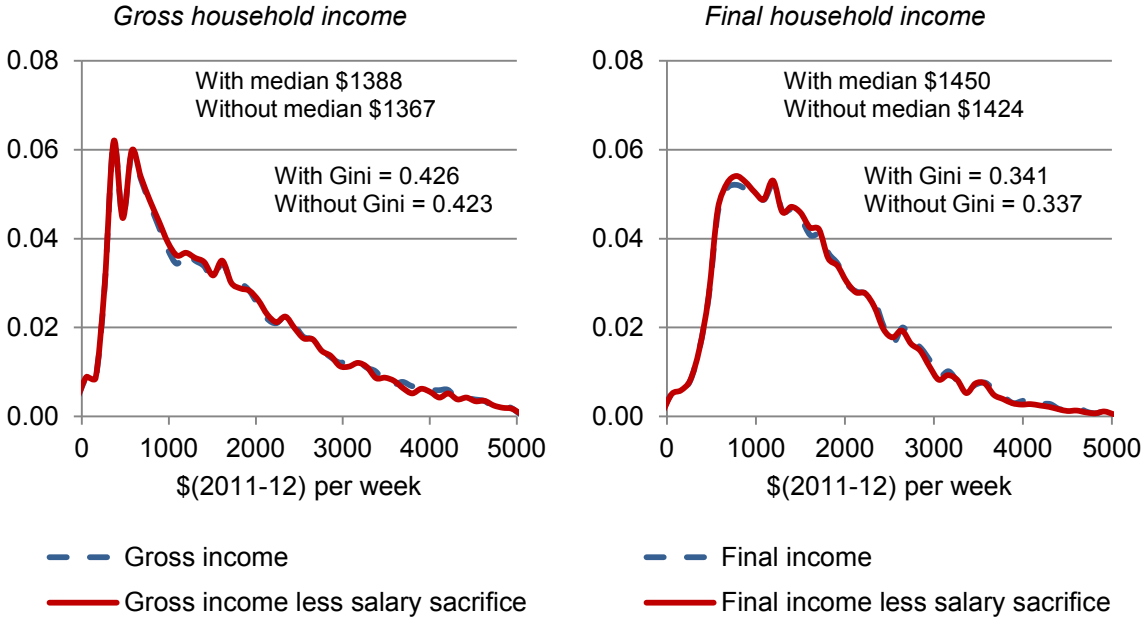
Annex: Impact of salary sacrifice income on the distribution of gross and final household income

In the 2009-10 Household Expenditure Survey a number of refinements were made such that the data collected were a more accurate representation of the income source defined. One of the largest changes in the 2009-10 compared to the 2003-04 survey was the better accounting of salary sacrifice income.[11]

By mapping individuals to households, household income can be adjusted to remove salary sacrifice income. This was done to examine the sensitivity of the distribution of income to this income item. While salary sacrifice income does influence the level of income earned by households (gross income is on average $21 higher, with final income $26 higher) it has little influence on the shape of the distribution (figure 3.25). As such, the observed trends in the distribution of income appear to be consistent with or without the inclusion of salary sacrifice benefits.

Figure 3.25 **Distribution of income with and without salary sacrifice**

Proportion of households[a]



[a] For presentation purposes only the income range between $0 and $5000 shown. Negative and incomes greater than $5000 are present in the data.

Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

11 Salary sacrifice is defined by the ABS (2012a, p. 164) as 'An arrangement under which an employee agrees contractually to forgo part of the remuneration, which the employee would otherwise receive as wages and salaries, in return for the employer or someone associated with the employer providing benefits of a similar value'.

Further, salary sacrifice benefits only have limited influence on the estimated Gini coefficient. For gross and final household income, the estimated Gini coefficient with salary sacrifice income is around 1 per cent higher than it would be if excluded.

Given these impacts, the improved income estimates provided in the 2009-10 survey were used in this study. However, despite the limited impact on the shape of the distribution and its trend, it is likely that the cumulative changes over time in the accounting of income in various Household Expenditure Surveys have influenced the estimates presented in this paper and as such caveats apply. For more detail on survey changes and their impact see appendix A and Wilkins (2013).

4 Australian trends in perspective

Key points

- In 2008, the OECD found that measured income inequality in Australia was above the OECD average.
  - Measured inequality was similar to other English-speaking nations — slightly above New Zealand and Canada, but less than in the United States.
- Australia has had considerably higher levels of real income growth across this distribution than that seen in other OECD countries.
  - Real equivalised disposable household income for the top decile grew by 4.5 per cent over the last 20 years, while the bottom decile grew by 3 per cent.
- The difficulties in estimating inequality consistently within one country are amplified when making international comparisons. Concepts of income, different years of analysis and varying business cycles will all influence trends.
  - Despite these difficulties, international comparisons of broad trends can be insightful. In particular they can highlight where the Australian experience is a reflection of developments in other economies, and where the experience differs.
- Comparisons between the trends in proximate factors identified by the OECD from the mid-1980s to late-2000s and those in this study over a similar time period (1988-89 to 2009-10) reveal some similarities and some differences.
  - For individuals, increases in full-time earnings, hourly wage dispersion, and the share of part-time work has increased measured inequality in Australia and most OECD countries
  - For households, although the measures used are not strictly comparable, it appears the equalising impact of rising employment has been stronger in Australia than other OECD countries. In Australia, rising employment (particularly in lower incomes deciles) has offset increases in individual labour force earnings inequality. In contrast, in most OECD countries increases in individual labour force earnings inequality have tended to be larger than offsetting employment effects, and are cited as a key driver of rising household inequality.
- Further work is required to understand the factors underlying changes in relative wages and participation rates, and the impacts of government policies on changes in Australia's distribution of income.

Changes in the distribution of individual and household incomes have been identified in chapters 2 and 3 of this report. In this chapter, the degree to which these changes are mirrored in other OECD countries is explored and areas for

further work suggested. As the OECD conducts its analysis and country comparisons using estimated Gini coefficients, the chapter follows this approach.

The difficulties in estimating inequality consistently within one country are amplified when making international comparisons. Concepts of income, differences in the years analysed and varying business cycles will all influence trends. In addition to understanding the broader growth context, care is needed to ensure the same income measures are being compared across countries. The broad OECD comparisons are based around comparisons of equivalised disposable household income. Yet, as the analysis in chapter 3 demonstrated, in-kind benefits can make a major contribution to the final income of household members.

Another problem is accessing data for a common year. If these are not available the validity of the comparison can be limited where there have been major global events, such as the global financial crisis, that affect . The OECD attempt to overcome differences in the availability of data across countries by categorising years into groups, late-2000s and mid-2000s for example. Within each time period the actual survey year varies between countries, Australia's late-2000s data comes from the 2007-08 SIH and Japan's data are from a 2006 survey, both years pre-date the global financial crisis. On the other hand New Zealand's data are from 2008-09, a crisis year.

On a different note, the timing of the survey instrument relative to a country's business cycle can also affect the distribution of income, so it may not be relevant to compare the same year if countries are at a very different point in the cycle.

Despite these difficulties, international comparisons of broad trends can be insightful. In particular, they can highlight where the Australian experience parallels developments in most developed economies, and where the experience differs. This comparison is most useful for examining the factors that can affect the distribution of income. The next two sections compare the broad trends in these proximate factors (that underlie broader distributional changes) for OECD countries with those found in this study for Australia. Trends observed in the HES data in this study are compared against those identified in the OECD's 2011 *Divided We Stand* report.

4.1 The wider context for comparison

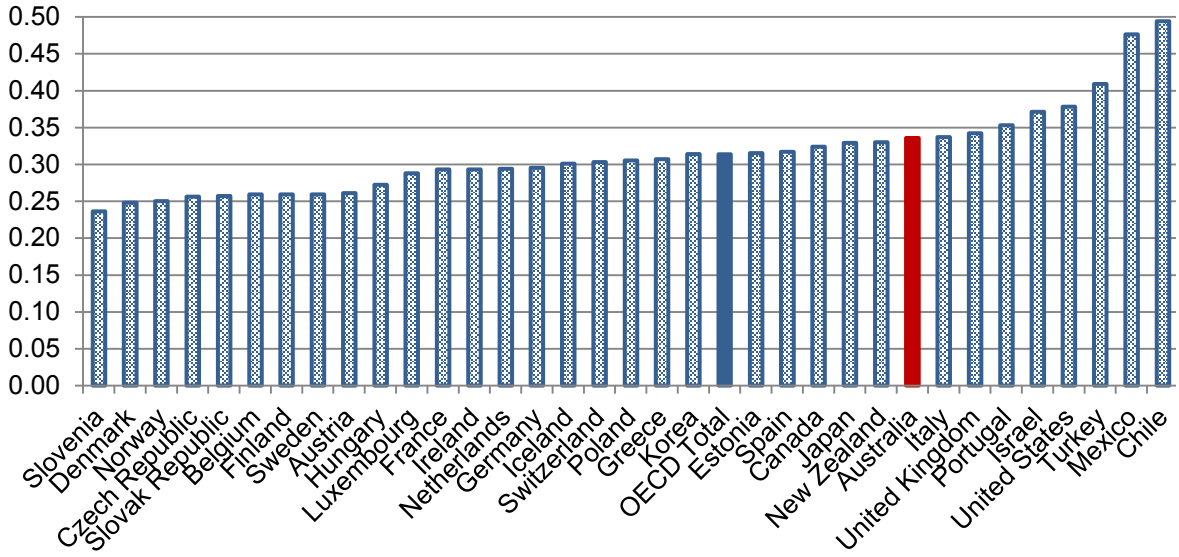
Australia's current position

Based on OECD estimates, in 2008 Australia's distribution of household income (based on equivalised disposable household income) was more unequal than most

other OECD countries. Australia had a Gini coefficient of 0.336 compared to the OECD average of 0.315 (figure 4.1)[1]. This was not unusual for the English-speaking countries — Australia's Gini coefficient was below that of Great Britain and the United States, and slightly above New Zealand and Canada (Ireland is the exception as it is below the OECD average).

Figure 4.1 **Household Gini coefficients of selected OECD countries, late-2000s**

Gini coefficient



Data source: OECD (2012a).

Australia achieves a relatively large reduction in market income inequality from direct government payments, reducing the Gini coefficient by 0.097 (about 20 per cent), compared to most other OECD countries (with the average reduction being 0.078 or 17 per cent) (OECD 2008). At the same time, it has one of the lowest levels of transfer payments as a proportion of household disposable income, 14 per cent of household disposable income compared to 21 per cent (OECD 2008). These features coincide as a result of Australia having one of the most progressively targeted cash transfer systems in the OECD (Whiteford 2010). In-kind transfers (such as government supported health and education services) reduce Australia's Gini coefficient by a further 17 per cent (a reduction of 0.052) which is slightly less than the OECD average inequality reduction of 20 per cent (reducing the OECD Gini by 0.059) (OECD 2011)[2].

[1] Note that OECD figures are based on the SIH data.

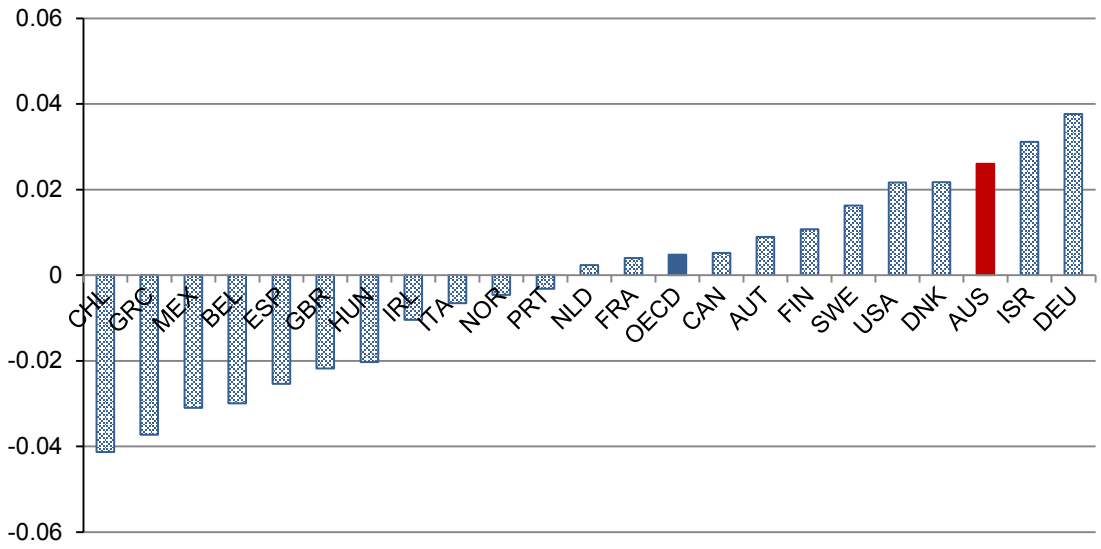
[2] The OECD (2011) uses two approaches to calculate the distribution of in-kind transfers across households, the "actual consumption approach" which allocates the value of public services to

Recent changes

After being relatively stable between 1988-89 and 2003-04, household income inequality in Australia has increased (to 2009-10). These changes observed in the 2000s have been substantial by international standards, with Australia's Gini coefficient growing faster than most other OECD countries (figure 4.2). The HES data used in this study shows the same trend, albeit with a smaller change in the Gini coefficient.

Figure 4.2 **Change in household Gini coefficient, OECD countries, 2000 to 2008**

Gini coefficient



Data source: OECD (2011).

The broader context of income growth

The changing shape of the distribution of income, and associated changes in measures of inequality, should be seen in the context of overall growth in real incomes. While most OECD countries experienced real income growth over the past decade, the performance of the Australian economy stands out. From 1995 to the late 2000s Australia experienced overall equivalised disposable household

the individuals that are actually using the service; and the "insurance value approach" which allocates an equal amount of a service to everybody sharing the same characteristics such as age and gender. Estimates for education, child care and social housing services are based on the actual consumption approach, while health and elderly care are based on the insurance value approach.

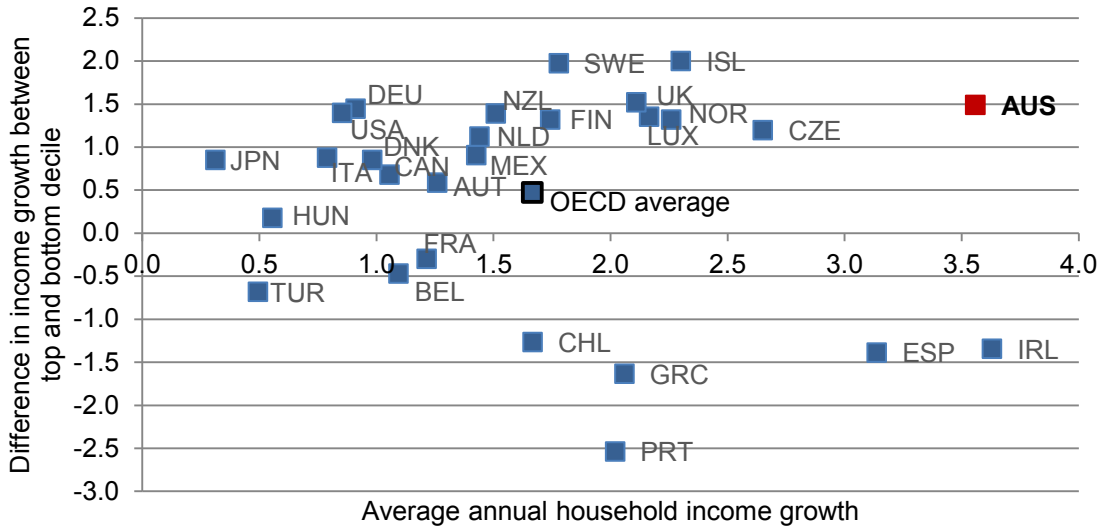
income growth of over 3.5 per cent compared with the OECD average (between the mid-1980s and late 2000s) of 1.7 per cent (OECD 2011).

In Australia, like most OECD countries, over the past two decades the rise in inequality is the result of households in the top deciles experiencing faster growth in income than the bottom deciles. For example, average growth in real household disposable income for the top decile earners was 1.9 per cent in OECD countries, while the bottom decile experienced lower income growth of around 1.3 per cent (OECD 2011). Again, the key difference with regard to Australia is its considerably stronger record of growth across the distribution — real equivalised disposable household income for the top decile grew by 4.5 per cent over the last 20 years, while the bottom decile grew by 3 per cent (OECD 2011).

When the different income growth rates between the top and bottom income deciles are plotted against overall income growth, Australia is also an outlier (figure 4.3). Other notable outliers are Spain and Ireland which had both high overall household income growth between the mid-1980s and 2008 but with incomes for households in the bottom decile growing faster than for those in the top. Greece and Portugal, along with Chile, also experienced income growth in the bottom decile that exceeded that of the top decile.

Figure 4.3 **Overall household income growth versus growth differences between the top and bottom deciles, OECD countries, mid-1980s to late 2000s**

Per cent



Data source: OECD (2011).

4.2 Are the trends observed in Australia observed internationally?

Individual earnings in Australia

In Australia, the largest component of individual market earnings is derived from labour force earnings — accounting for, on average, 93 per cent of market income between 1988-89 and 2009-10.

Over this period, average real labour incomes have increased significantly, from around (AUD) $800 per week in 1988-89 to $1100 per week in 2009-10 — an increase of 40 per cent in real terms. Average labour incomes have grown faster at the top of the distribution than at the bottom. This finding masks some fundamental trends in Australia's labour income story:

- *Full-time workers*: Representing around 62 per cent of workers in 2009-10 (68 per cent in 1988-89), income growth is the result of increases in hourly wages which have also become more dispersed.
- *Part-time workers*: Representing around 30 per cent of workers in 2009-10 (19 per cent in 1988-89), income growth is the result of increases in both hours worked and hourly wages. However, measured inequality within this group has been relatively stable over time.
- *Self-employed workers*: Representing around 8 per cent of workers in 2009-10 (13 per cent in 1988-89) self-employed workers (those who own an incorporated business) have the greatest and most volatile income dispersion. This has been consistent through time despite the falling relative size of this group.

Analysis of HES data suggests rising inequality of individual market income has been largely due to the greater dispersion of hourly full-time wages (measured inequality has been stable among part-time workers and no clear trend is evident among the self-employed). The increasing share of part-time workers has also contributed to the rise in labour income inequality amongst workers.

Capital & other income, the other component of market income, is highly concentrated and has become more so over time. However, it is a small proportion of overall individual market income, accounting for around 6.5 per cent in 2009-10, and contributes relatively little to the overall increase in inequality.

Does the Australian experience reflect international developments?

According to the OECD (2011), measured labour earnings inequality has been increasing for workers in all OECD countries between mid-1980s and mid-2000s (Denmark, Hungary and Ireland were the exceptions). The increase in market income inequality observed in Australia reflects this international trend, however some of the underlying sources of change differ.

For most countries, increases in the dispersion of hourly wages for all worker sub-groups had the greatest impact on overall earnings inequality (OECD 2011). From the mid-1980s to the mid-2000s, the distribution of individual wages for all earners became more unequal — wages for the highest paid 10 per cent grew faster than for the lowest paid 10 per cent for 16 out of 23 OECD countries, five countries had no significant difference in wage growth for these groups and only France and Spain experienced a decline in wage dispersion (OECD 2011).

The evidence is less clear as to the impact of different employment categories on distributional trends. The OECD (2011) outlined some changes in the dispersion of income amongst full-time, full and part-time, and all worker sub groups in OECD countries[3]. Their analysis suggested that, for most countries, the dispersion of income for full-time workers increased between the mid-1980s to mid-2000s, however, the impact of adding in part-time workers varies considerably across countries. For example, in Germany and the Netherlands earnings inequality increased by more when part-timers were included than when full-timers were analysed alone. This is in contrast to the English-speaking countries, where increases in earnings inequality among full-timers and part-timers were lower than for full-timers alone (OECD 2011). Because the dispersion of part-time income alone is not reported, it is not possible to determine whether trends are due to changing income dispersion amongst part-timers, changing ratios of part-time to full-time workers, or a combination of both.

Household earnings in Australia

Overall, labour income growth has been the dominant contributor to changes in Australian household incomes, accounting on average for at least 50 per cent of the *change* in household incomes between survey periods observed over the past 20 years (and 75 per cent of the change in income over the period as a whole). On the

3 There are a number of issues related to the comparability of the OECD data: the times periods over which the changes are measured are not consistent across countries. For example, the time period 1979-2004 was used for the United States and 1995-2004 for Greece and roughly half of the countries have reported gross earnings and half net earnings.

other hand, changes in household structure (type and partnering) have not contributed to the recent trends in the distribution, despite their importance in explaining the overall distribution of household incomes.

Growth in households' labour income in Australia has mainly been the result of two broad effects.

- For low income households, increased employment by household members have increased labour earnings. The proportion of jobless households has also fallen.
- For households with high incomes, higher labour earnings appear to be driven primarily by higher wages.

Of these two effects, the impact of employment growth has dominated the impact of wage trends on household *labour* income, causing measured inequality to fall.

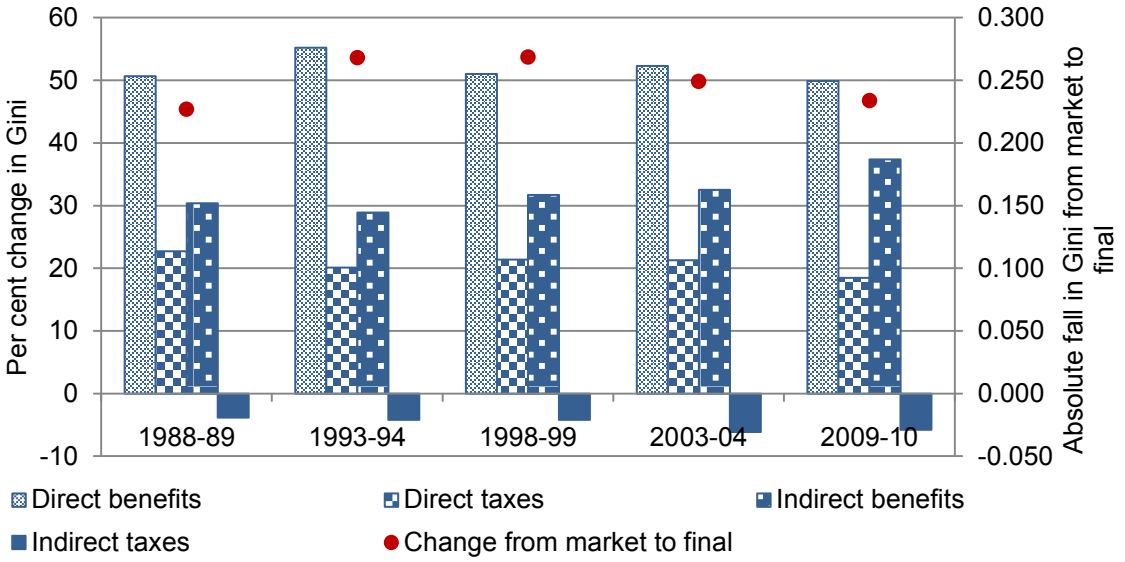
Despite falling levels of household labour income inequality, household *market* income inequality has recently risen. This is a result of changes in capital & other income, particularly for households in the 10^{th} (gross) income decile. Between 2003-04 and 2009-10, average capital & other income in the 10^{th} decile more than doubled. This shift has been responsible for much of the increase in equivalised final earnings inequality over this period.

Australian government tax and transfer policies further shape the distribution of final household income and significantly reduce measured equivalised market income inequality (figure 4.4).

- Direct government benefits have increased for recipient households, but the proportion of households receiving benefits has fallen consistent with increasing workforce employment. This has lessened the impact direct payments have on lowering measured inequality — payments lowered inequality of equivalised market income by 23 per cent in 2009-10 compared with 28 per cent in 1993-94.
- Indirect government benefits have risen in real terms and are evenly allocated across the income distribution. The payments effect on reducing market income inequality has increased over time — lowering inequality of equivalised market income by 17 per cent in 2009-10 compared with 15 per cent in 1993-94.
- The share of income paid as direct taxes have fallen over time, with the largest falls seen for those in higher income deciles while the share of indirect taxes has increased. The changes to the tax system since 1988-89 have reduced the overall progressivity of the tax take. Direct taxes lowered inequality of equivalised market income by 9 per cent in 2009-10 compared with 10 per cent in 1993-94. Indirect taxes increased the equivalised market income Gini coefficient by 3 per cent in 2009-10 compared with 2 per cent in 1988-89.

Figure 4.4 **Contribution of taxes and transfers to the difference between inequality of equivalised market and final income, Australia**

1988-89 to 2009-10, per cent of fall in Gini coefficient



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

Does the Australian experience reflect international developments?

Between the mid-1980s to mid-2000s, the OECD (2011) found that household earnings inequality increased in most countries. Increasing labour income inequality was identified as being the dominant source of growth in household earnings inequality, with the major change being increasing dispersion in male earnings in 21 out of 23 countries studied. In ten countries, increased inequality was a result of growth in real earnings in the top decile combined with a decrease for the bottom decile (OECD 2011). This, however, was partly offset by increasing female employment levels for 20 out of 23 OECD countries. In 14 of the countries studied, female employment increased by more than ten percentage points (OECD 2011).

The OECD (2011) found that for most of the countries examined, the growing spread in male labour earnings resulted in increases in household income inequality. The Australian experience differs in this respect. While individual labour earnings have become more spread in Australia (and, as with other OECD countries, more-so for men than women), increases in employment have meant that at the household level, inequality in household labour earnings has recently fallen.

However, there is a major difference between the OECD (2011) analysis and the analysis undertaken for this report. The OECD restricted the sample of households to those with at least one earner. The OECD (2011) states that trends in earnings

inequality among *all* households would depend more strongly on changes in the proportion of non-working households, compared to trends for households with at least one earner.

Although increases in inequality were predominantly driven by labour earnings in most OECD countries, the increased concentration of capital income has contributed to the trend of rising income inequality across almost all OECD countries studied (OECD 2011). Capital income share in total income was modest in most countries and similar to Australia at around 7 per cent. As a share of household disposable income, capital income increased (from a very small base) in more than two-thirds of OECD countries over the last 30 years (OECD 2011). This increase predominantly accrued to households at the top of the income distribution (countries which experienced no increase in the share of capital income also experienced increases in the concentration of capital in higher income households).

The strong redistributive effect of taxes across many OECD countries remained broadly at the same level between the mid-1980s and mid-1990s but became slightly weaker between the mid-1990s and mid-2000s (OECD 2011). Experiences varied across countries. In Australia, Finland, Israel, Sweden and the United Kingdom, the equalising effect of direct taxes weakened steadily over the past 20 years. According to the OECD (2011), the key factor behind this decline was a reduction in the share of direct taxes in total income.

The OECD (2011) also found that reductions in income inequality due to direct government payments increased between the mid-1980s and the mid-1990s for many OECD countries, but then decreased in the subsequent decade. These contrasting developments may be explained by changes such as changing unemployment and thus unemployment benefits or by discrete policy changes. As in most other OECD countries, the redistributive impact of direct government payments and taxes has fallen in Australia over the last decade. However, when indirect benefits (in-kind services) are taken into account, the impact of government redistribution on measured household income inequality has remained fairly stable. Combined, government taxes and transfers reduced market inequality in Australia by 48, 51, 52 and 51 per cent in 1988-89, 1993-94, 1998-99 and 2003-04 respectively. It was 49 per cent in 2009-10. Australia's tax and transfer system remains one of the most progressive systems among OECD countries.

On average, for the 23 OECD countries studied, the share of workers married to a person in the same earnings decile grew from about six per cent in the mid-1980s to eight per cent in the mid-2000s. Luxembourg stood out with the largest increase: the proportion of husbands and wives in the same earnings deciles increased from 2.3 per cent in 1985 to 7.4 per cent in 2004. The Czech Republic and Finland were the

only countries which did not display this trend (OECD 2011).The dominant trend with respect to household structure, observed in all OECD countries, has been the increase in single headed households, which rose by an average of five per cent from the mid-1980s to the mid-1990s (OECD 2011). The OECD found that these demographic factors, in particular assortative mating, contributed positively to increased household earnings inequality in most countries, but had much more modest impact compared to the labour market. In Australia, these compositional shifts do not appear to have contributed to the recent (since 2003) increase in household income inequality.

4.3 Areas for further work

This paper has described the proximate factors that have led to changes in the distribution of income in Australia. What it does not attempt to do is to identify the underlying factors that have caused the changes in relative wages, participation rates, and government transfers (work has been done by the OECD, see box 4.1).

Box 4.1 **OECD analysis of underlying factors explaining inequality**

The OECD (2011) explored some of the underlying causal factors at play. It analysed the extent to which the following economic changes explained the growth in income inequality in member nations to draw the following conclusions:

- Increased globalisation, measured as increased trade integration (through trade flows) and financial openness did not have a significant effect of either wage inequality or employment trends in OECD countries.
- Increased financial flows and technological change did have significant effects on wage dispersion. Greater foreign direct investment was associated with greater wage dispersion in the upper half of the distribution, while technical change increased overall dispersion. These findings suggest that skill biased technical change is an important determinant of growing wage inequality.
- Regulatory reforms were found to play a role in increasing employment levels and increasing wage dispersion. Reforms which strengthen competition in goods and services markets were found to increase employment levels. Lower unemployment benefit replacement rates also increased employment levels. Counter to these effects, the OECD found that reduced employment protection legislation decreased employment levels. However, all changes also increased wage dispersion as they encouraged lower skilled workers to join the workforce.

Source: OECD (2011)

Further research would help to identify the underlying causes of the observed shifts in these proximate factors for Australia.

- Analysis of the causal factors underlying changes in the dispersion of the hourly wages of full-time workers over the last 20 years in Australia. International research could usefully guide this undertaking. Whether the international influences hold in the Australian context could be explored, especially given the effects on labour and capital shares of the major terms of trade changes in recent years. The importance of regulatory, taxation and transfer policy changes could also be explored.
- More sophisticated and comprehensive decomposition analysis could provide valuable information about the origins of changes in inequality, namely whether changes are broad-based or the result of large changes in particular sub-groups. Brewer, Muriel and Wren-Lewis (2009) offer a useful model in this regard. They analysed inequality in Great Britain since 1968. Decomposition methods used include: more detailed decompositions by subgroup and income; specifying decompositions such that they also provide estimates of the impact of changing population shares; and the use of factor (regression) based decomposition. Another useful example is provided by Jenkins and Van Kerm (2004).
- The use of HES data in this study has facilitated the examination of in-kind social transfers and the impact of indirect taxes. The data are only available for five points in time and so could be sensitive to periodic policy change, making it less representative of the experience over the period. While not including in-kind benefits, validation of the broad trends using the more frequent Survey of Income and Housing data could identify the extent of important 'within period' developments.
- Own unincorporated businesses exhibit unique patterns in the data (high volatility, negative income and double peaked income distribution), and little research has been done on the small but significant group in the Australian context. Yet, the inclusion of this group has a considerable impact on measured inequality levels. Better understanding of the factors influencing small business behaviour is needed to interpret the effects of incorporating this group into broader income data.

A Summary measures of the dispersion of income

A wide variety of methods can be used to illustrate and measure the degree of income dispersion in a population.

Incomes vary between individuals and households for a number of reasons which are often complex — for example, workforce attachment (full- or part-time work) and wage rates are driven by a number of factors including educational qualifications, experience and employment opportunity. Summary measures of inequality alone, therefore, provide very limited information about the distribution of income. They should be interpreted as statistical indicators of the dispersion of income only, rather than being used as indicators of underlying causes of differences or other wider interpretations.

This appendix describes the most commonly used methods and inequality indexes which have been used in this study and briefly describes their relative strengths and weaknesses. The measures discussed include:

- percentile ratios and income shares
- the Lorenz curve
- the Gini coefficient
- the generalised entropy indices.

All of these measures are scale invariant — that is, a uniform increase in income for all does not change the measure of dispersion. Usual measures of variance (or standard deviation) are scale dependant making them inappropriate for measuring the distribution of income across population groups (Jenkins and Van Kerm 2008).

A.1 Percentile ratios and income shares

Income shares and percentile ratios are the simplest measures of income dispersion. Commonly used indices include the ratio of income levels of the 90^{th} to 10^{th} percentile ('P90:P10 ratio'), and as a comparison of dispersion at the top and bottom of the distribution, the P90:P50 ratio and the P50:P10 ratio.

The income estimate at a given x percentile represents the value of income below which x per cent of all incomes fall. For example, the income value at the 50th percentile means that 50 per cent of people earn less than that income (the 50th percentile is the same as the median income). Income at the 90th percentile means that 90 per cent of the population earn less than that amount.

One of the advantages put forward for using percentile ratios is that they avoid the problem of 'top-coding' in survey data (where instead of the actual income being reported, it is only reported as greater than some amount). They can also be used to determine the 'location' of dispersion — that is, among which groups income disparities are the greatest. However, percentile ratios focus on the percentiles examined and therefore ignore information about the spread of incomes that occur elsewhere in the distribution.

A related measure is the examination of income shares. Income shares describe the share of total income accruing to particular groups. It is most often used to describe how concentrated income is at the top of the income distribution, in particular the highest 10 per cent, one per cent and 0.1 per cent of earners. These ratios are constructed by expressing the total income earned by those in, for example the top 10 per cent, as a share of total income earned by the entire population (or sub-group). Again, as with percentile ratios such measures can ignore information on the spread of incomes that occurs elsewhere in the distribution.

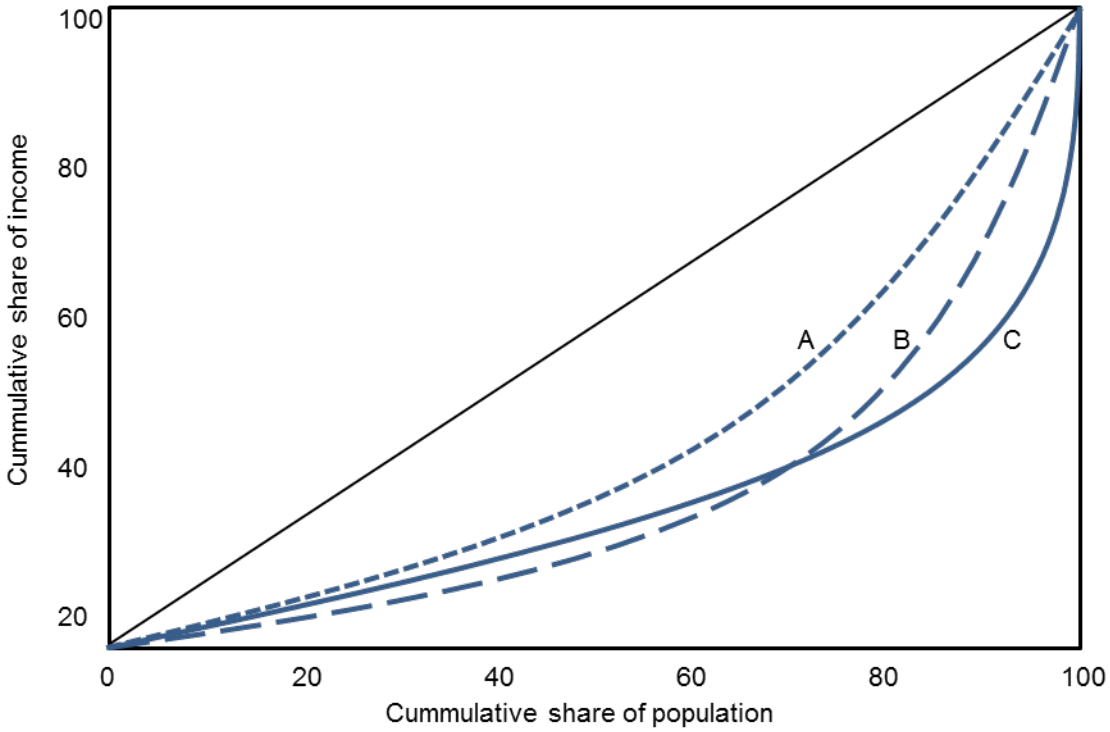
A.2 Lorenz curve

Income ratios are only able to compare two parts of a distribution rather than describe the distribution as a whole. An alternative to ratios is the depiction of the spread of incomes within the population through the Lorenz curve (and indices derived from it such as the Gini coefficient — see following section).

The Lorenz curve, named after Max Otto Lorenz (1905), maps the cumulative proportion of the population, ranked by income, against their cumulated share of income (figure A.1). If all individuals within a population earn the same income the Lorenz curve is a 45 degree line (often termed 'perfect equality'). When individuals within the population earn differing amounts, the curve takes on an exponential shape and lies below the 45 degree line (curves A, B and C in figure A.1). The larger the gap between the Lorenz curve and the 45 degree line, the less equal the income distribution. That is, Lorenz curve A represents a more equal income distribution than curves B and C. If the Lorenz curves of two populations cross each other, such as Lorenz curves B and C, it is difficult to determine in which population income is distributed more equally. However it is still possible to

identify differences in the distributions quickly, for example the lowest income earners in population C earn a larger share of total income than the lowest earners in population B.

Figure A.1 **Lorenz curve**
Per cent

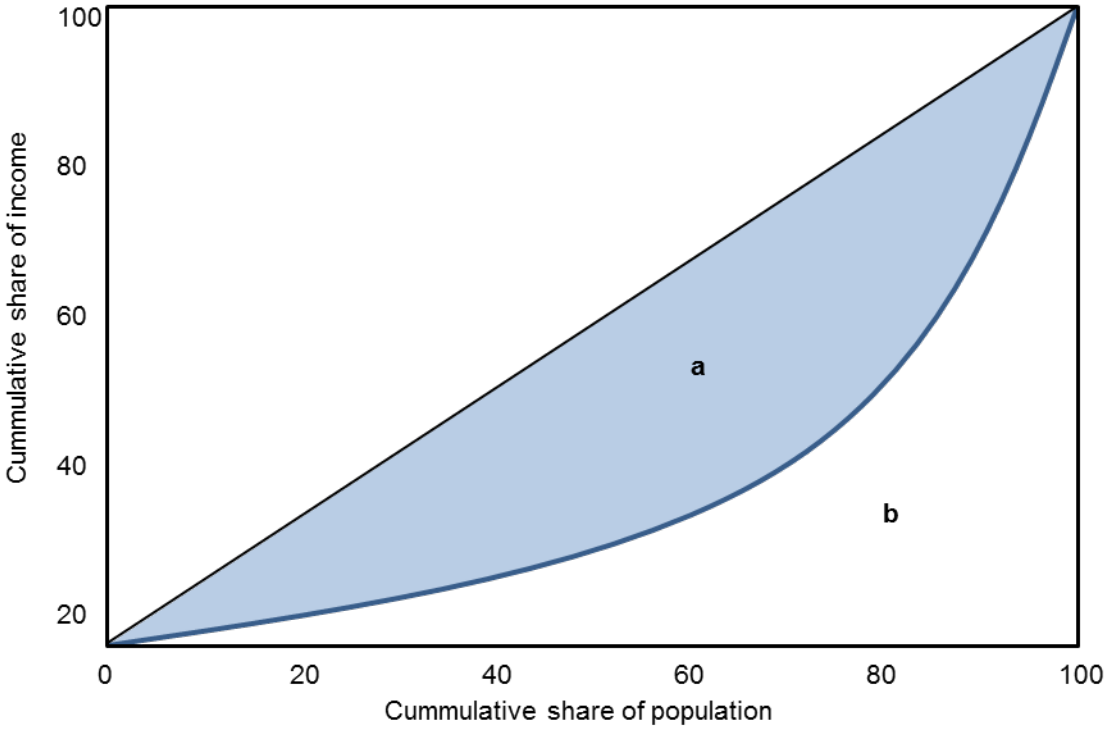


A.3 Gini coefficient

The Gini coefficient, named after the Italian statistician Corrado Gini, is a popular summary statistic for measuring the dispersion of income across a population. It is defined as the ratio of the area between the 45 degree line and the Lorenz curve (area 'a' in figure A.2) and the area under the 45 degree line (areas 'a' + 'b' in figure A.2). If individuals with a population all earn the same amount the Lorenz curve lies on the 45 degree line and area 'a' is equal to zero, hence the Gini coefficient is equal to zero. At the other extreme, if one person in a population earns all the income, the Lorenz curve runs along the x-axis and up the right hand side of the diagram meaning area 'b' is equal to zero and the Gini coefficient is equal to one.

In reality, populations will lie somewhere between these extremes. Populations with more equally distributed income have a Gini coefficient closer to zero, those with less equally distributed incomes have a Gini coefficient closer to one.

Figure A.2 **Lorenz curve and the Gini coefficient**
Per cent



There are numerous equivalent methods of calculating the Gini coefficient, two examples are shown below. The left-hand side equation is derived from calculating the area under the Lorenz curve for a population and using this to calculate the Gini coefficient. The right-hand side equation is calculated from the covariance between a population member's income level (such as a household or individual) and their cumulative rank amongst all members of the population.

$$Gini = \left(\frac{2}{\mu n^2}\sum_{k=1}^{n} kY_k\right) - \frac{n+1}{n} = \frac{2cov\left(Y_k, \frac{k}{n}\right)}{\mu}$$

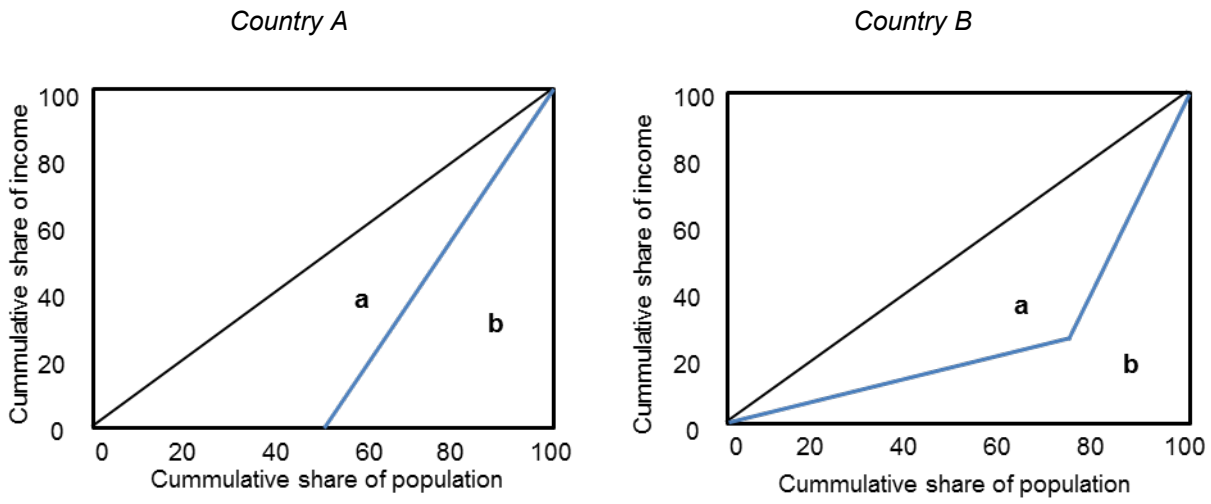
where the arithmetic mean of household disposable incomes is $\mu = \frac{\Sigma_i \Sigma_j Y_{ij}}{n}$, n is total number of individuals, Y_i denotes disposable income of household i, Y_{ij} denotes the adjusted equivalised income of each member, j, of household i, and

household incomes per equivalent household members $(Y_{ij}=Y_k)$ are ranked in ascending order (such as $k = 1, 2, ...n$).

While indices such as the Gini coefficient make use of information across the entire income distribution (unlike percentile ratios and income shares), they also have a number of shortcomings. For example, two societies with the same Gini coefficients can have very different distributions of income. Consider a hypothetical country (country A) in which 50 per cent of the population receives all the income earned in equal amounts (that is, total income is distribute equally amongst 50 per cent of the population (figure A.3, left panel). The Gini coefficient for country A would be 0.5. Another country (country B) where 25 per cent of all income is earned equally by 75 per cent of the population with the remaining income earned equally by 25 per cent of the population would also have the same Gini coefficient — 0.5 (figure A.3, right panel). Despite having the same Gini coefficient, these countries have very different underlying income distributions as seen when examining the Lorenz curves (figure A.3).

Figure A.3 **Lorenz curves showing different income distributions for the same Gini coefficient**

Per cent



The Gini coefficient, as with other indices, can also be affected by the level of granularity of income data. It has been found that for the same population, higher granularity reduces measured inequality (Monfort 2008). For example, a Gini coefficient estimated using quantile data (low granularity) will usually yield a lower estimate than one based on deciles or quintiles (higher granularity).

A.4 Generalised Entropy indices

Generalised entropy indices are a family of indices describing income distribution in a population. They are similar to the Gini coefficient in that they produce a single number describing the level of distribution. However, the indices can be adjusted to give greater weight to particular sections of the income distribution (such as weighting disparities between the bottom and top earners more heavily than disparities between earners in the middle of the income distribution). The indices can range from zero, all receive the same income, to infinity, with higher numbers representing wider distributions.

The general formula for Generalized Entropy indices is:

$$E_\alpha(Y) = \frac{1}{\alpha^2 - \alpha} \int \left(\left(\frac{y}{\mu} \right)^\alpha - 1 \right) f(y) dy$$

where the value of α determines the sensitivity of the index to certain parts of the income distribution (Jenkins and Van Kerm 2008). The larger (more positive) α is the more weight is placed on distribution at the higher income end of the spectrum. The smaller or more negative α is, the more weight is given to distribution at the low income end of the income spectrum. Two of the most famous members of the generalised entropy index family are the mean logarithmic deviation, where $\alpha = 0$, and the Theil index, where $\alpha = 1$.

Generalised entropy indices have the added advantage of being decomposable into sub-groups, such as age or labour force status (unlike the Gini coefficient which is only fully decomposable if the incomes of the sub-groups do not overlap). The entropy index for the population as a whole is then the weighted sum of the entropy indices for each of the population sub groups. This enables analysis of sub-group effects on the main drivers of the overall income distribution.

B Data and related issues

The data for the analysis in this paper has been drawn from various Household Expenditure Surveys (HESs) collected by the Australian Bureau of Statistics (ABS). Through this survey, the ABS collects data on household's spending, in total and by component, forms of income and other household characteristics. The survey was first conducted in 1974-75. For this report, five surveys conducted from 1988-89 to 2009-10 have been used (the 1988-89, 1993-94, 1998-99, 2003-04 and 2009-10 surveys). Over this time sample sizes have varied from below 7000 to over 9000.

The ABS has made numerous changes to the HES since its introduction as it attempts to improve the quality of the survey and its estimates. These changes mean that estimates of many of the variables collected may not be consistent over time. Of importance to this study are changes that may impact on the measurement of household income as these have the potential to influence observed changes and therefore trends in incomes and their distribution from one survey period to the next. This can create uncertainty surrounding the robustness of observed distributional trends and may even misrepresent changes in summary statistics of inequality over time.

Many of the changes to income surveys in the 2000s have impacted on estimates of income — significantly for some groups. Changes have been made to capture newer forms of income such as salary sacrifice benefits and provide for a better accounting of investment and own-business income. Such changes are likely to provide a more complete account of incomes at the top of the distribution, raising measured dispersion of income over time. Thus, it is likely that, in part, some of the upward trend in inequality in the mid to late 2000s reflects better measurement of income rather than underlying changes. This influence has led some researchers to question the reliability of estimates obtained from surveys such as the HES.

While it is likely that changes in survey design and data collection have influenced measured income and trends in summary measures of income dispersion such as the Gini coefficient, it is unlikely that they have had a pervasive impact on the trends observed in the distribution of income across the entire population (as depicted in the Annex to chapter 3). Therefore, given the nature of the analysis presented in this paper, the HES represents a reasonably robust information source from which trends in the distribution of income can be explored. Nevertheless, the major

changes in survey design are canvassed in this appendix as they will impact statistics such as the Gini coefficient.

Further, researchers such as Wilkins (2013) have found that different data sources paint a different picture of income inequality and its trends in Australia. These issues are also discussed briefly in this appendix.

B.1 How has the HES changed?

The ABS's survey methodology has been evolving since the introduction of the HES in the 1970s. The most significant of the changes to income were introduced in the 2003-04 and 2009-10 surveys. Box B.1 summarises the changes to the ABS's survey methodology that have influenced income measurement.

The impact of changes in 2003-04

In 2003-04, the HES was combined with the ABS's Survey of Income and Housing (SIH), increasing the length of the survey for participants and consequently increasing non-response (and possibly response bias). The integration of the surveys also resulted in an expansion in the information collected on wealth in the HES, from an estimation of owner-occupied dwellings and some household loans to a more comprehensive range of assets and liabilities as per the SIH. The process of providing more detailed information on these items has been assessed by the ABS to have improved the accuracy of reported income from them.

The most significant change occurring in the 2003-04 HES was in the measurement of income from investments and own unincorporated businesses. Previously, these income streams were estimated based on reported income for the previous financial year. From 2003-04, the data have been measured using respondents' estimates of expected income in the current financial year. According to the ABS, this improves the data significantly, with the year-on-year movements between current and previous year income from these two items now aligning more closely with the related national accounts items. However, the change causes a clear break in the data series, and it is uncertain whether the difference between the two methodologies would remain constant over time. This raises the question of whether this has simply caused a point shift in the data, or whether the impact varies over time, for example in relation to changes in the business cycle (ABS 2006).

Box B.1 **Summary of changes to income measurement in HES**

2003-04

- Change in measurement of current income from own unincorporated business and investments from reported income for the previous financial year to respondents' estimates of expected income in the current financial year.
- Inclusion in employment income of all salary sacrificed income and non-cash benefits received from employers.
- Collection of a more detailed range of income items and information on all assets and liabilities of respondents.

2009-10

- Questions added to the survey on the amount of 'additional' overtime respondents expect to earn in the given year (in addition to 'usual' overtime).
- Netting off of interest paid from interest earned on borrowed funds to purchase shares or units in trusts, previously only gross interest earned was recorded for investments other than rental properties.
- Inclusion of termination payments and workers' compensation lump sums, with an upper boundary of three months wages.
- Inclusion of irregular bonuses in employment income (in addition to regular bonuses)
- Expansion of family financial support from regular cash payments, mainly child and spousal support, to also include other forms of financial support including goods, services, rent, education (capital transfers, such as cars for example, remain excluded).

Sources: ABS (2006, 2012a).

The ABS provides estimates of income based on both the new and old collection methods. Summary estimates of gross income for all households and household earnings from an own unincorporated business, hereafter termed self-employed household income, using both the old and new 2003-04 basis indicate that the impact of the changes on gross household income are small (gross household income is made up of employee income, income from own unincorporated businesses, direct government payments and other sources) (table B.1). However, the impact of the changes on self-employed household income are larger.

The changes reduce both the mean and median self-employed earnings and its standard deviation. One possible explanation for the reduction in the standard deviation is the reduction in the number of households reporting negative self-employment incomes. This effect can be seen more clearly in figure B.1 (left panel). Some negative self-employment income under the old definition (the dotted line), appears to have been shifted to slightly positive income under the new definition (the solid line), as reflected in the higher peak of the solid line next to the y-axis.

Table B.1 **Impact of survey changes on gross and self-employed household income in 2003-04**

2003-04 dollars

	Gross household income		*Self-employed earnings*	
Summary statistic	*Previous HES basis*	*2003-04 HES basis*	*Previous HES basis*	*2003-04 HES basis*
Mean	1 124	1 126	648	609
Median	921	928	464	400
Standard deviation	954	919	1150	975
Gini coefficient	0.41	0.40	0.72	0.68

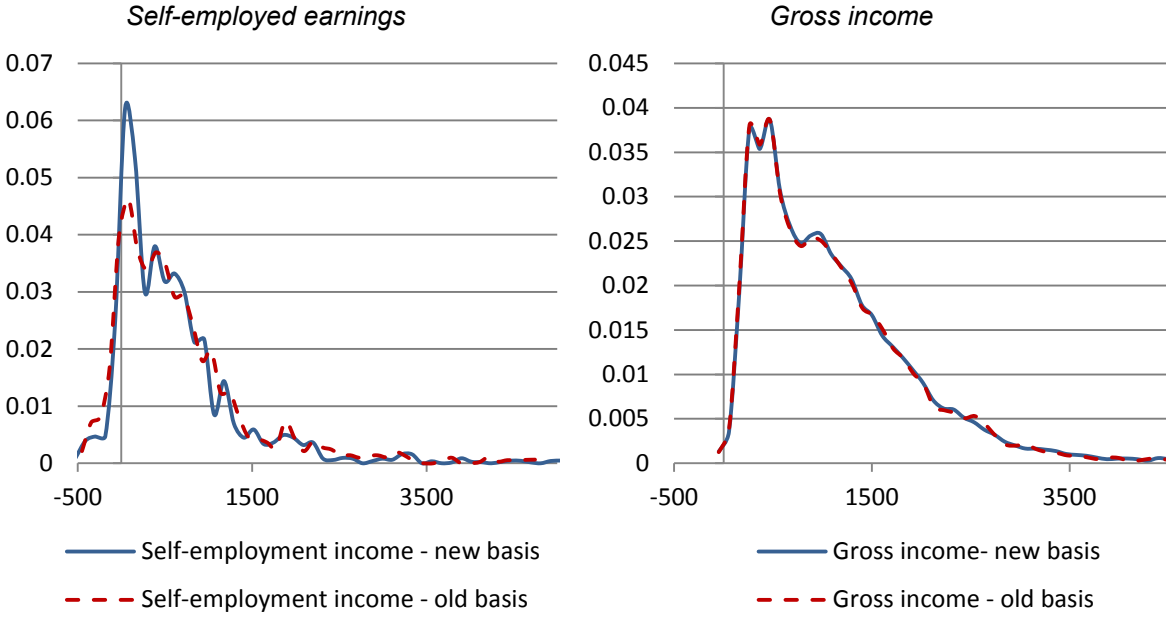
a Self-employed is defined as those with non-zero earnings from own unincorporated businesses.

Source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

The reason for little change in gross household income stemming from the revised measurement of own unincorporated business income is that only around 8 per cent[1] of households earn income from this source. In terms of the distribution, it is difficult to observe the impact (figure B.1, right hand panel).

Figure B.1 **Distribution of gross and self-employed household income, old and new basis in 2003-04**

Proportion of households



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

[1] Share differs between 2003-04 and previous measurement basis.

The impact of changes in 2009-10

In the 2009-10 HES, the concept of household income was altered to comprise all current receipts, whether monetary or in kind, that are intended to support current consumption. In previous surveys, income was limited to regular cash income only. Employment income was expanded to include all payments received by individuals as a result of their current or former involvement in paid employment. These include non-cash benefits, bonuses, termination payments and payments for irregular overtime, and the inclusion of lump sum workers' compensation receipts.

A wider range of data on financial support received from family members resident outside the household was also included. In addition to regular payments previously collected, financial support was extended to include other forms of financial support, including goods and services received which were purchased by others such as rent, education, food, clothing, car registration and utilities. Capital transfers, such as the purchase of property or cars, remain excluded.

Some changes were also made to investment income; netting out of interest paid from income earned on money borrowed to purchase shares or units in trusts, and the reclassification of income earned as a silent partner in a partnership and some private trust income as investment income rather than unincorporated business income.

The impact of these changes can been seen by examining the differences between the new income estimates compared to those obtained using the previous method. While the 2009-10 HES does not have comparable estimates on a pre-2003-04 nor a 2003-04 basis, differences between the 2005-06 and 2009-10 methods can be explored, although there is a small difference in the measurement of wages and salaries between the 2003-04 HES/SIH and the 2005-06 SIH.[2] Summary statistics for gross household income (table B.2) indicate that the changes made in the 2009-10 HES have slightly increased income on average, raising both the mean and median incomes by less than five per cent, and also increasing the standard deviation and Gini coefficient a little.

[2] Previously estimates included only some salary sacrificed amounts, this was changed to all amounts being included.

Table B.2 **Impact of survey changes on gross and self-employed household income in 2009-10**

2009-10 dollars

	Gross household income	
Summary statistic	*2005-06 HES basis*	*2009-10 HES basis*
Mean	1 619	1 684
Median	1 287	1 316
Standard deviation	1 607	1 689
Gini coefficient	0.42	0.43

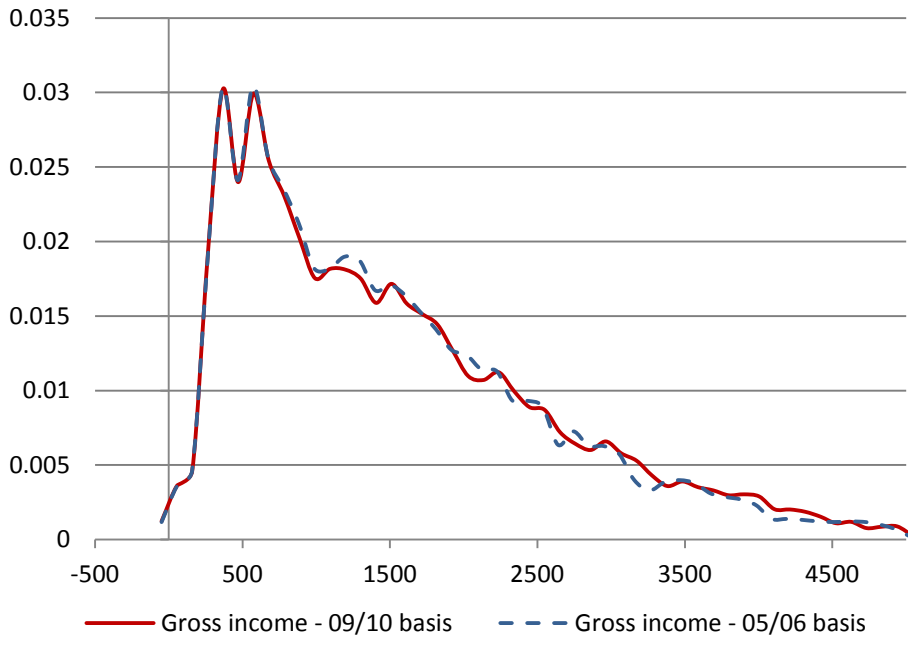
[a] Self-employed is defined as those with non-zero earnings from own unincorporated businesses.

Source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

The difference between the 2005-06 definitions and 2009-10 appear to be negligible for lower income earners (those earning less than $1000 per week) (figure B.2). The 2009-10 changes create some change in the distribution for higher earners.

Figure B.2 **Distribution of gross household income, old and new basis in 2009-10**

Proportion of households



Data source: Author estimates based on ABS (Household Expenditure Survey, cat. no. 6503.0, confidentialised unit record files).

B.2 Differences between data sources

Differences in survey methodology and definitions of income result in inconsistencies not only within the HES series over time but also when comparing measures of income distribution across different data series.

As noted in this paper, information on income was obtained from the ABS HES surveys, however, other sources of income information exist. The HILDA survey, for example, has been used by other researchers to explore trends in the distribution of income in Australia over time. Estimates using the HILDA survey data are likely to differ from those obtained using ABS data due to differences in survey design. Further, some researchers have found inconsistencies in observed trends amongst data collected by the ABS depending on whether it is reported on an annual or weekly basis. These differences are outlined below.

Weekly, annual and HILDA based estimates of inequality

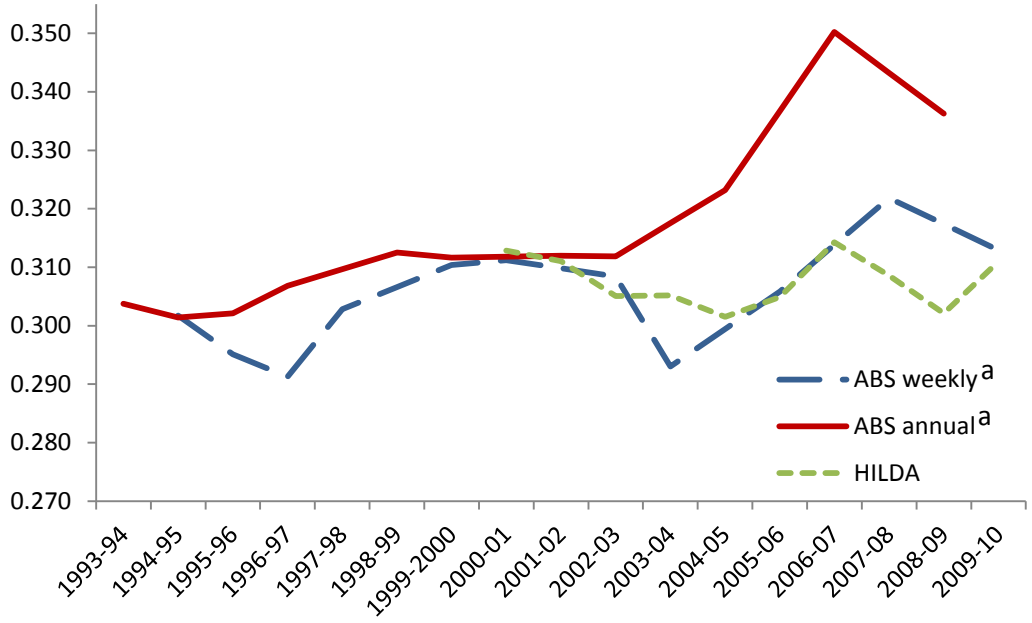
In the SIH (and HES) income is measured in two ways — weekly income is calculated from reported current income (that is the income received at the time the data was collected) and annual income (calculated from previous financial year data). In the SIH, the two series show different changes in income inequality between 2002-03 and 2005-06. Overall, the weekly series suggests very little overall change in household equivalised income inequality whereas the annual series suggests a large increase in income inequality (figure B.3).[3]

When income data from the HILDA survey is included in the comparison, the general trend in estimated income inequality appears consistent with results from the weekly SIH data series, although with less variation from year to year. The HILDA survey methodology has remained consistent over time avoiding the sampling problems with ABS data discussed above. However, HILDA is a longitudinal study, surveying the same households every year, which exposes it to different biases in regard to assessing changes in the distribution of income relative to the SIH and HES. HILDA may not take into account some demographic changes in the population which could change the structure of the labour market and ultimately the overall distribution of household earnings. For example, immigrants entering Australia over the survey period could not enter the sample between years 2001 and 2010 (unless they joined a household with original sample members) as only households selected in wave 1 could be reinterviewed in this period. Further, the SIH and HILDA surveys have different designs. One focuses on income while

3 Summary estimates from the SIH used to provide a more comparable time series to HILDA data than what could be obtained from HES data.

the other covers a wider range of topics. Given this, it is likely that both question design, coverage of topics and benchmark data against which household weights are generated will differ. These factors will influence the results of any summary statistics such as the Gini coefficient.

Figure B.3 **Gini coefficient for equivalised disposable household income**



a Pre-2007 basis, estimates were adjusted for some changes in methodology over time, see Wilkins (2013) for more detail.

Data source: Wilkins (2013).

The key lesson from these data comparisons is that differences in survey methodology and definitions of income can result in different estimates of income inequality. Estimates of year-on-year changes in the Gini coefficient are not consistent over different data series making it difficult to determine what exactly has happened to income inequality in Australia using this statistic alone. According to Wilkins (2013) close analysis of changes in distribution of employment, wages and investment income and other decomposition analysis may yield more reliable information on the changes in income distribution in Australia over this period compared to simple headline measures such as the Gini coefficient.

C How does Australia compare internationally?

The dispersion of measured income and levels of estimated income inequality have been found to vary greatly across countries. This appendix summarises recent OECD reports on measured income inequality. It outlines the OECD's findings on the proximate factors that help explain variations in income distributions among OECD countries — including its results for Australia. More details can be found in OECD (2008, 2011, 2012b) and the OECD Economics Working Paper series *Less Income Inequality and More Growth – Are they Compatible?*[1].

It should be noted that there are difficulties in comparing country incomes and interpreting inequality measures based on such comparisons. Difficulties exist in consistently estimating the distribution of income within just one country, as a result ensuring consistent approaches across countries is even more problematic. Nevertheless, investigating the sources of apparent differences in summary measures can provide a starting point for further analysis of distributional differences within and between countries.

C.1 Australia in an OECD context

According to the OECD (2012a), Australia's dispersion of equivalised household disposable income as measured by the Gini coefficient was 0.34 in 2008, placing it slightly above the OECD average of 0.31 (figure C.1). By contrast, the lowest measured income inequality estimates are for countries concentrated in parts of Europe, particularly the north — Denmark, for example, has an equivalised household disposable income Gini coefficient of 0.25 (OECD 2012a). At the other end of the spectrum, developing countries have some of the highest levels of measured income with relatively high rates for countries in Latin America and Africa — for example, Chile has a Gini coefficient of 0.49 (OECD 2012a) and Rwanda has a Gini coefficient of 0.51 (World Bank 2012).

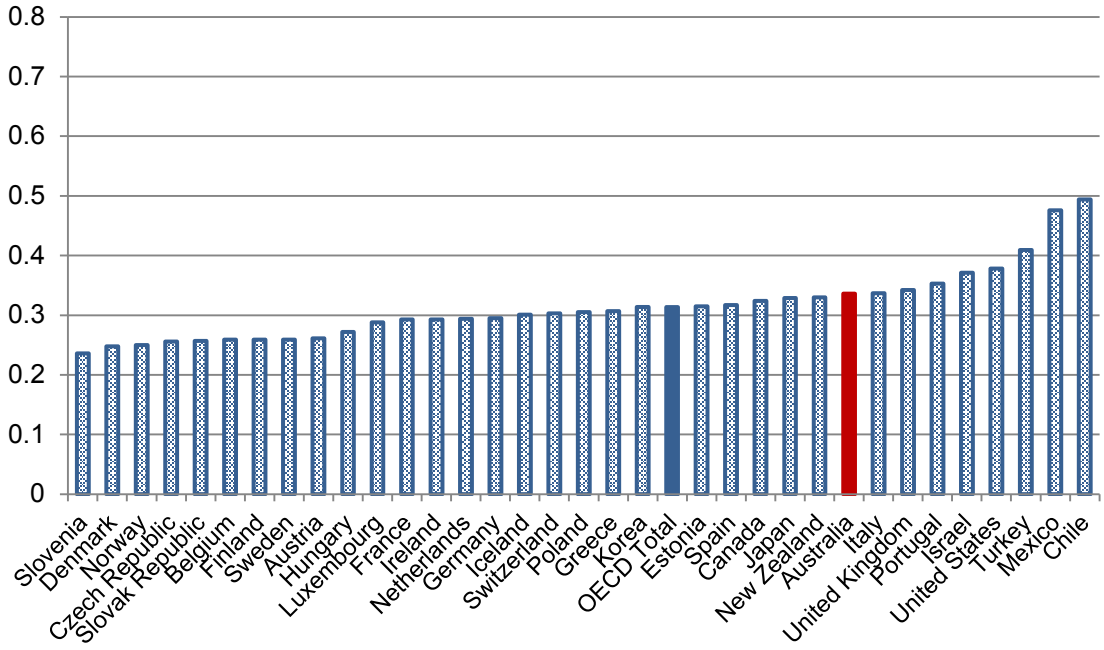
[1] More information is available at: http://www.oecd.org/eco/publicfinanceandfiscalpolicy/lessincomeinequalityandmoregrowth-aretheycompatible.htm

At the household level, differences in the distribution of income between countries are determined by differences in the dispersion of:

- labour income — employee earnings
- other market income — income from returns to invested capital and from other non-government sources
- government taxes and transfers — direct taxes and transfers measured by disposable income along with income from service provided 'in-kind'
- family formation — household size, composition and partnering behaviour.

Figure C.1 **Equivalised household disposable income inequality, late-2000s**

Gini coefficient



Data source: OECD (2012a).

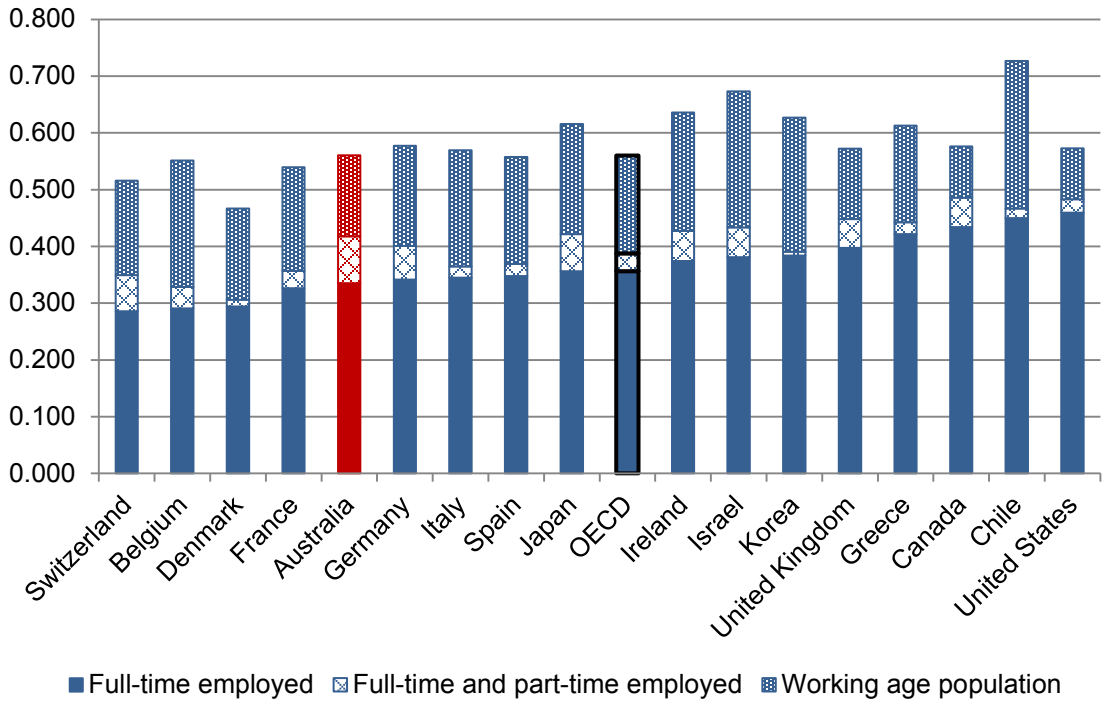
Labour income

There are a number of factors which influence the distribution of labour income, including differences in wage rates among full time workers, income dispersion among worker sub-groups (full- and part-time workers) and income dispersion among all persons of working age, including the jobless (which captures rates of inactivity) (Hoeller et al. 2012).

Hoeller et al. (2012) found that, among OECD countries, North and South American countries tend to have the widest income distribution for full-time workers, whereas Australia and New Zealand lay below the average Gini coefficient estimates for full-time workers in 2008 (figure C.2).

When part-time workers were included in the analysis, Hoeller et al.'s estimates of the Gini coefficients increased as income from part-time work tends to be much lower than for full-time work. The impact of the inclusion of part-time workers on the Gini coefficient will tend to be largest in countries where the ratio of part-time work to full-time work is highest. Australia's Gini coefficient is increased substantially with the inclusion of part-time workers compared to other OECD countries (figure C.2) due to its relatively high rates of part-time work (Hoeller et al. 2012).

Figure C.2 **Labour income inequality, 2008**
Gini coefficient, 15- to 64-year olds



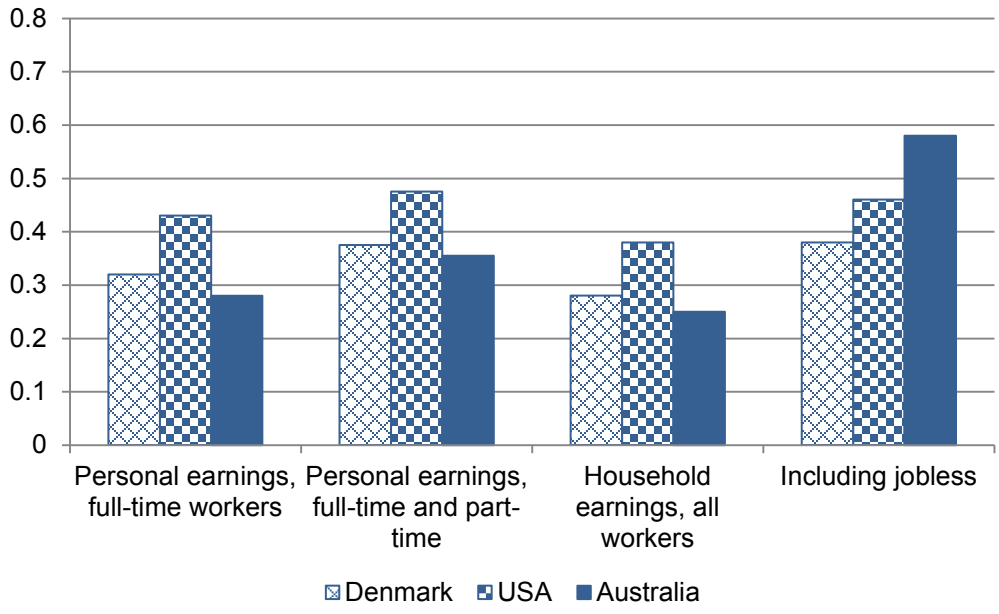
Data source: OECD (2012b).

The inclusion of unemployed and working aged people not in the labour force increases Hoeller et al.'s estimates of the Gini coefficient as the low income end of the market income distribution extends down to zero. The countries with the highest unemployment and lowest participation rates tend to have their Gini coefficient most affected by the inclusion of this group. Israel, Korea and Chile fall in to this

group while Australia's Gini coefficient is less affected compared to the OECD average (figure C.2).

At the household level, the story is more complex. Countries where joblessness is concentrated within particular households ('jobless households') will see a disproportionate impact on household income inequality when the entire population is considered compared to countries where joblessness is more spread (that is, where rates of jobless households are lower). Whiteford (2012) finds that a significant component of the difference in Australia's measured household income inequality compared to other OECD countries is due to higher rates of jobless households than seen in some other countries. For example, when comparing Australia's labour income distributions to Denmark (which has low household disposable income inequality) and the USA (which has high household disposable income inequality) Whiteford (2012) found Australia's labour income inequality to be lower than both when only the employed are considered. When people not in paid employment are included in the calculation Australia's labour income Gini coefficient jumps above both Denmark and the USA (figure C.3).

Figure C.3 **Working-age household earnings inequality in Australia, Denmark and the United States, 2005**
Gini coefficient



Source: Whiteford (2012).

Market income

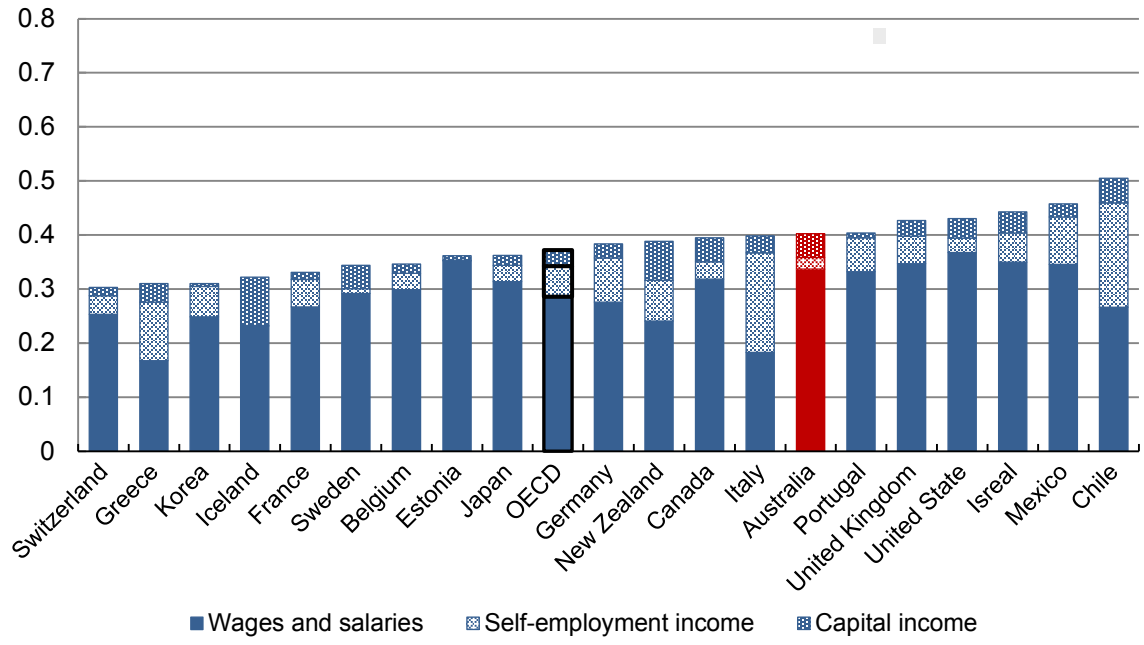
Total market income includes labour income, capital income, income from self-employment along with income from other private sources. OECD comparisons focus on the first three of these.

Across OECD countries, OECD (2012b) estimates indicate that the distribution of market income is mainly determined by the distribution of labour income. The analysis also suggests that capital income tends to increase estimates of market inequality, but only to a small degree for most countries.

The distribution of capital income tends to be much less equally distributed compared to other forms of income (Hoeller et al. 2012). Consequently, countries with higher estimated Gini coefficients (such as Australia) also tend to have capital income contributing more to their Gini coefficient compared to countries with lower Gini coefficients (figure C.4). However there are some outliers in the OECD analysis. For example Iceland has the largest contribution of capital income to its Gini coefficient (0.09) compared to the average (0.03), yet has a below OECD-average measured market income inequality (0.30 versus 0.37) (OECD 2012b). Similarly, Portugal has one of the highest estimated market income Gini coefficients in the OECD (0.40), yet capital income is estimated to contribute little to this (0.01).

Figure C.4 **Market income inequality, late 2000s**

Gini coefficient, working age population



Data source: OECD (2012b).

Distribution of wealth

One problem with measures of income inequality is that they can overstate or understate the distribution of consumption possibilities by ignoring household wealth, as both income and wealth contribute to households' capacity to purchase goods and services. For many, wealth is accumulated over time and higher levels may be held by those in retirement who have relatively low incomes (for example, in Australia many of those on the aged pension own their own homes and so have significant wealth but lower income). On the other hand, the distribution of wealth tends to be much more concentrated than the distribution of income, with significant amounts held by those who also have high incomes (and therefore the capacity to save and own assets). This suggests that any inequality measures that incorporated wealth would tend to report higher levels of inequality compared to income alone, and that this effect would be amplified the more unequal the distribution of income.

Unfortunately the small quantity of available data and lack of consistency across countries makes international comparisons difficult. Yet available data suggests that countries with low inequality in their income distributions do not necessarily have low inequality in the distribution of wealth and vice versa. For example, Credit Suisse (2011) estimated that Sweden, which has a very low income Gini coefficient of 0.26, had a high wealth Gini coefficient of 0.82 in 2011. Conversely, Italy and Australia, which have relatively high income Gini coefficients of 0.34, were estimated to have relatively low wealth Gini coefficients of 0.61 and 0.63 respectively (Credit Suisse 2011).

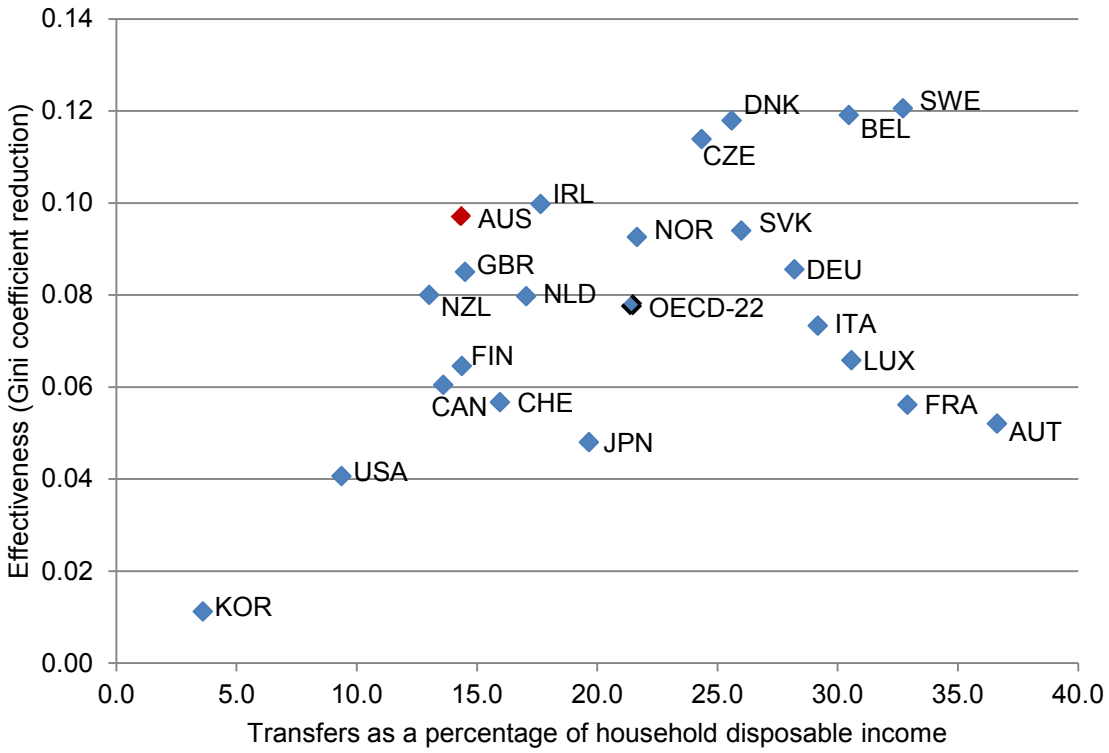
According to Davies et al. (2008) the lowest 50 per cent of households in the wealth distribution hold only a tiny fraction of total wealth in most countries, between -18 (Denmark) and 21 per cent (Japan). By contrast, the top 10 per cent hold between 39 (Japan) and 76 per cent (Denmark) of total wealth. Australia lies in between these extremes with the bottom 50 per cent of households holding nine per cent of total wealth and the top ten per cent holding 45 per cent (Davies et al. 2008).

Including taxes and transfers: household disposable income

The distribution of disposable income (market income less direct taxes plus government cash transfers) is narrower than market income due to the typically progressive effect of taxes and transfers. The impact of taxes and cash transfers on the income distribution depends on size, mix and progressivity of the system, which vary across OECD countries. On average the distribution of income after taxes and transfers, as measured by the Gini coefficient, has been found to be about 25 per cent lower than that for market income in the late 2000s (Joumard et al. 2012).

Joumard et al. (2012) found that in all OECD countries, cash transfers have a larger redistributive impact than taxes. The cross-country variation in the redistributive impact of cash transfers reflects differences in the size of transfers — countries with higher rates of cash transfers tend to reduce income dispersion the greatest — but the progressivity of these transfers is also important. For example, Australia was estimated to have attained a much larger reduction in inequality from cash transfers than France despite Australia having one of the lowest levels of cash transfers as a proportion of household disposable income in the OECD while France has one of the highest (figure C.5). The study suggests that this is a result of Australia having one of the most progressively targeted cash transfers systems in the OECD, driven by a greater reliance on income taxes, which are more progressive than other taxes, and on means-tested cash transfers. On average, Joumard et al. (2012) found that countries which have large cash transfers tend to be less progressively targeted, as the bulk of these transfers are aimed at redistributing income across life-cycles, mainly funding old-age pensions, rather than from high to low-income earners.

Figure C.5 **Effectiveness of public cash transfers in reducing inequality**

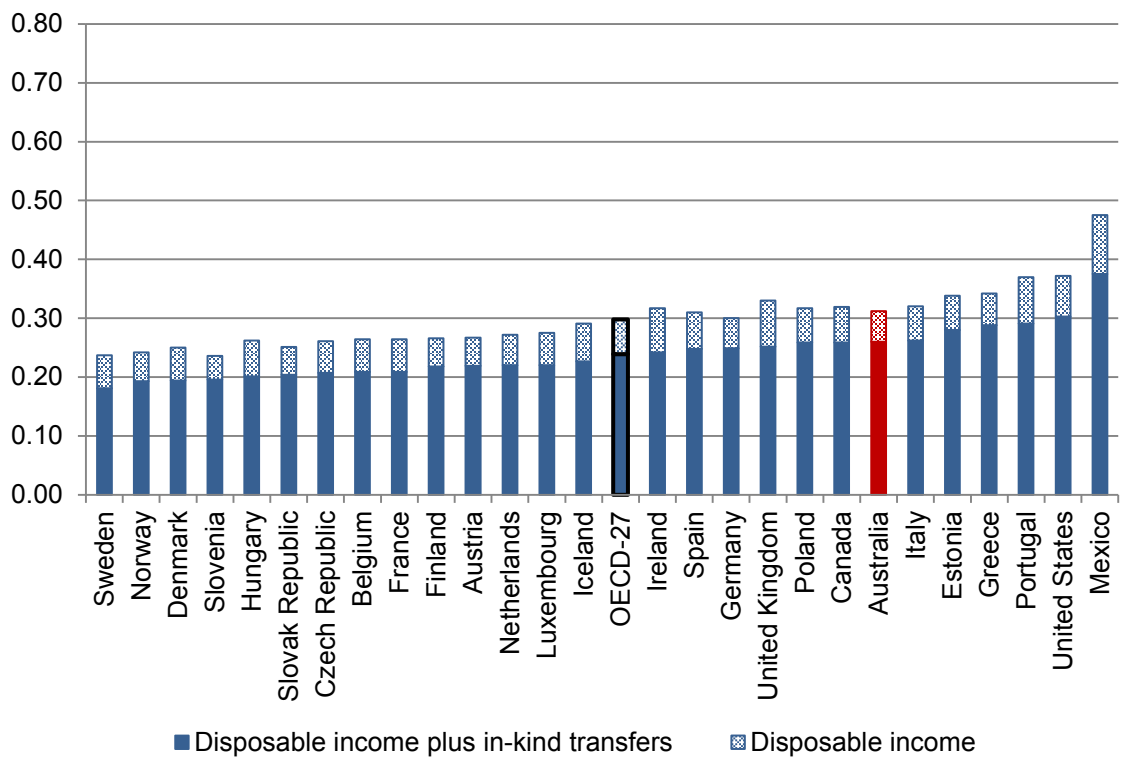


Data source: OECD (2008).

In-kind transfers

The OECD (2011) observed that in-kind transfers were larger than cash transfers in Australia and most other OECD countries in the mid-2000s. With healthcare and education consuming most of those funds. The analysis found that these in–kind transfers reduce measured inequality in all countries by a similar amount — around 20 per cent. This reduction had the effect of reducing the estimated average OECD Gini coefficient for final income from 0.30 to 0.24 (a smaller reduction than from the inclusion of cash-transfers) (figure C.6). Consequently, the inclusion of in-kind transfers had little impact on the OECD's *relative* inequality estimates between countries, although important from the perspective of income inequality levels.

Figure C.6 **Impact of in-kind transfers on income inequality**
Gini coefficient



Data source: OECD (2011).

Family formation

Inequality in household income can also be affected by changes in household demographics, such as increases in assortative mating rates and shifts in household structures. The OECD (2011) found assortative mating rates, the proportion of couples with incomes in the same decile and quintile, to have increased from six to

eight per cent and 34 to 39 per cent respectively between the mid-1980s and the mid-2000s. The largest convergence of incomes occurred in Luxembourg, the United Kingdom and the Netherlands with two to three fold increases in marital income homogeny. However, assortative mating rates in Australia were found to have remained relatively steady, with the proportion of couples in the same income decile increasing from 5.8 to 6.3 per cent over the same period of time (OECD 2011).

Changing household structures can also contribute to greater dispersion in the distribution of household income, particularly if increases occur in the number of single headed households. The OECD (2011) found the share of single headed households had increased across the board in all OECD countries under study, on average by almost five percentage points. In Australia the proportion of single headed households was found to have increased from 17 to 22 per cent between 1985 and 2003 (OECD 2011).

While these demographic measures were found to increase the income distribution, the OECD (2011) estimated the impact to be very small for all countries analysed. For Australia, the OECD (2011) estimated that assortative mating and the increase in the proportion of single headed households each increased the Gini coefficient by 0.006 between the mid-1980s and mid-2000s (the total increase in the Gini coefficient was 0.032 over this period).

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