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Evaluating the Evidence on
Income Inequality in Australia in the 2000s

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Abstract

Published ABS data from the Survey of Income and Housing (SIH) show a substantial increase in income inequality between 2001 and 2010. However, almost all of the increase occurred over a period when changes in survey methodology and income concept were occurring. I document these changes, present results of analysis of the SIH unit record data, and present independent evidence on income inequality trends using the HILDA Survey, tax records and National Accounts. I conclude that the SIH overstates the growth in income inequality, even when the income variable examined is notionally consistently defined across surveys. The extent of overstatement is uncertain, however, reflecting ambiguity about the nature and extent of changes to the distribution of household market income.

JEL classification: D3

Keywords: Income inequality, household surveys, decomposition

1. Introduction

The distribution of economic wellbeing is a fundamental metric of a society and the subject of much debate and policy interest. Much of the discussion focuses on the distribution of income and how it has changed over time. Self-evidently, it is better that such discussion be based on good data that accurately represents both levels and trends in the distribution of income. It is therefore important that income distribution data is carefully scrutinised and its reliability is evaluated.

Most of the research on income inequality in Australia over the last two decades has relied on data from ABS household income surveys. Aside from publications based on the income survey data produced by the ABS itself (see, for example, ABS (2011)), these studies include Saunders et al. (1991), Saunders (1993), Harding (1995, 1997), Barrett et al. (2000), Pappas (2001), Athanasopoulos and Vahid (2003), Johnson and Wilkins (2004), Saunders (2004), Saunders and Bradbury (2006), OECD (2008, 2011), Doiron (2011) and Whiteford (2013).[1]

The consensus view that emerges from the above studies is that inequality has risen over each of the last three decades. However, as the primary source of information on income distribution levels and trends, the household income surveys of the ABS clearly warrant particularly close scrutiny. Indeed, a recurring issue affecting these studies is change to ABS methods and concepts affecting inter-temporal comparability. Saunders (2003) describes a number of issues that arise in analysing changes over the 1990s. He particularly notes that the surveys up to 1990 are not comparable to the surveys conducted from 1994-95 onwards due to a significant change in survey methods associated with a switch from a dedicated two-month survey in the December quarter of the survey year to a 12-month survey conducted as part of the Monthly Population Survey. Siminiski et al. (2003a, 2003b) also examine inter-temporal comparability of ABS household surveys, considering all the surveys conducted between 1982 and 1997-98. They examine only income aggregates, although they also describe sources of incomparability that may not necessarily have affected income aggregates. They particularly countenance against use of the 1982 income survey. The main problems with the surveys conducted in the 1990s (1994-95, 1995-96, 1996-97 and 1997-98)

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[1] Indeed, research on income inequality in Australia accelerated in the 1990s with the increased availability to researchers of ABS unit record data (although increases in computing power available to researchers were no doubt also a factor in the surge in research activity). The ABS household income surveys are not the only source of income distribution data. Several studies that have drawn on the ABS Household Expenditure Survey (e.g. Greenville et al., 2013 and Saunders and Bradbury, 2006) and, more recently, the HILDA Survey (e.g., Wilkins, 2013a). Further, Atkinson and Leigh (2007) use tax records to examine top income shares. Among the few studies prior to the 1990s are Podder (1972), Murray (1978) and Meagher and Dixon (1986). Podder used data from the Survey of Consumer Expenditures and Finances 1966-68, Murray used data from the 1968-69 ABS Income Distribution Survey and Meagher and Dixon used data from the 1978-79 ABS Income Distribution Survey.

were subsequently addressed by the ABS in 2003 by reissuing population weights to account for decline in coverage of welfare recipients.[2]

This study focuses on the period since 2001, a period that has seen further significant changes in ABS methods. Studies of the ABS data for this period, including ABS (2011a), Doiron (2012), Greenville et al. (2013) and Whiteford (2013), have documented a substantial rise in income inequality. However, as I describe in the paper, almost all of the increase occurred over a period when changes in survey methodology and income concept were occurring. While the ABS attempts to make income data more comparable across time, essentially by producing alternative income variables that are more comparable across surveys, it is only able to partially account for the changes, the most important of which were introduced in the 2003-04 survey, the 2005-06 survey and the 2007-08 survey.

In this paper, I describe the changes to ABS concepts and methods in the SIH over the 2000s, compare the SIH with three independent data sources over this period—the HILDA Survey, tax records and the National Accounts—and examine the sources of changes in measured inequality, including how these differ between the SIH and the HILDA survey. The analysis is aimed at ascertaining the extent to which measured distributional changes in the SIH reflect 'true' change to the income distribution as opposed to change induced by changes in measurement. This is undertaken by closely examining, in conjunction, the changes to ABS methods and concepts, the extent to which different income series are in agreement, and the sources of differences across income series. The goal is to provide a clearer picture of income distribution trends, but also to identify where uncertainties exist.

The plan of the paper is follows. In Section 2, I describe income distribution trends since 1994 as produced in ABS publications. In Section 3, the changes to ABS survey methods and income measure are described, while in Section 4, notionally comparable income series are identified and estimates for each series are presented in every year the series is available. In Section 5, the SIH is compared with an independent data source, the HILDA Survey, a nationally representative household panel that commenced in 2001. Section 6 then compares the SIH and HILDA Survey data with estimates from tax data, following the approach pioneered by Atkinson, Picketty and Saez (2011) and applied to Australia by Atkinson and Leigh (2007). Section 7 examines changes in the extent of 'income capture' by the SIH, comparing survey estimates of total national household income with household income aggregates derived from the National Accounts. The sources of differences between alternative income series from the SIH and the HILDA Survey are investigated in Section 8. Concluding comments are presented in Section 9.

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[2] Weights were reissued for all surveys between 1994-95 and 1999-2000. The revised weights are used in all analysis reported in this paper.

2. Trends in the income distribution as per ABS published data

The ABS first conducted a household income survey in 1969, and followed this with similar surveys in 1974, 1979, 1982, 1986 and 1990. Since 1994-95, income surveys have been conducted at least once every two years. In total, 22 household income surveys have been conducted by the ABS, although (public-release) unit record data is only available for the surveys conducted since 1982. The three surveys from 1982 to 1990 were conducted over a two-to-three-month period in the December quarter of the year, while the surveys since then, called the Survey of Income and Housing (SIH)[3], have been conducted over a 12 month period aligning with the Australian tax-year (1 July to 30 June). In addition to the change in timing of the survey, there were changes to the income data collected and the income concept from 1994-95 onwards compared with the earlier income surveys; see Siminiski et al. (2003b) for details.

In this paper, the focus is on the 2000s, but estimates from all of the SIH (back to 1994-95) are presented, thereby providing some context for the estimates in the 2000s. Figures 1 to 3 and Table 1 present features of the income distribution over the 1994-95 to 2009-10 period adopting the ABS income concept in place at the time the survey was conducted.[4] The income measure is household weekly income inclusive of government benefits (transfers) and after payment of income taxes, adjusted for household size and composition using the 'modified OECD' scale (Haagenaars et al., 1994). The OECD scale divides household income by one plus 0.5 for each household member aged 15 years and over and 0.3 for each child under 15 years of age. It is a widely used adjustment for household composition and has been used in the ABS publication *Household Income and Income Distribution* since the 2000-01 SIH (ABS, 2003, 2005, 2007a, 2009a, 2011a). Negative household incomes are set equal to zero. The in-scope population comprises all residents (including children) of private dwellings in Australia other than military personnel and people living in remote areas. The 'unit of analysis' is the individual, so that the statistics presented are for the distribution of household equivalised disposable income across all individuals in the in-scope population.

For the statistics for which comparisons are possible, the estimates presented in Figures 1 to 3 and Table 1 closely match those published by the ABS in ABS (2003) for the SIH conducted from 1994-95 to 2000-01.[5] The estimates for 2002-03 to 2009-10 likewise closely match those published at the time of initial release in ABS (2003, 2005, 2007a, 2009a, 2011a).[6] However, because the ABS has revised its income concept over

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[3] The survey conducted in 1999-2000 was called the Income and Housing Costs Survey.

[4] However, estimates for the five surveys in the 1990s use the revised population weights provided by the ABS in 2003 as a result of a review of the representativeness of the surveys, which showed declining coverage of government benefit recipients (ABS (2003), Appendix 4).

[5] ABS (2003) is the first ABS publication containing estimates for disposable income using the modified OECD equivalence scale. Prior publications (e.g., ABS, 2001) used the 'unmodified' OECD equivalence scale and the 'Henderson' equivalence scale.

[6] The very slight differences are attributable to the ABS 'perturbing' the income data in the public-release unit record file (see, for example, ABS (2011b), p.81). The ABS has not provided any details on this process, but it should be noted

the 2000s, ABS publications for the surveys from 2003-04 onwards have contained revised estimates for earlier surveys. Estimates presented here therefore differ from those revised estimates. For example, in ABS (2005), the reported Gini coefficient for 2003-04 is 0.294, which is the value reported in Figure 2. However, in ABS (2007a) the reported Gini coefficient for 2003-04 is 0.297, and in ABS (2009a) it is 0.306.

Figure 1 shows very strong growth in real median and mean equivalised disposable incomes between 1995-96 and 2007-08. Growth was particularly rapid between 2002-03 and 2007-08, with median income at December 2010 prices increasing by one-third, from $29,107 to $38,889, and mean income increasing by 39 per cent, from $33,085 to $45,914. Median and mean incomes follow very similar paths over most of the period, the notable exception being 2005-06 to 2007-08, when mean income grew by 19 per cent, compared with 15 per cent for median income. The SIH thus indicate that the mid-2000s was a period of exceptionally rapid growth in average household incomes.

Figure 1: Average household equivalised weekly disposable income - SIH, calculated as per ABS published data (annualised)
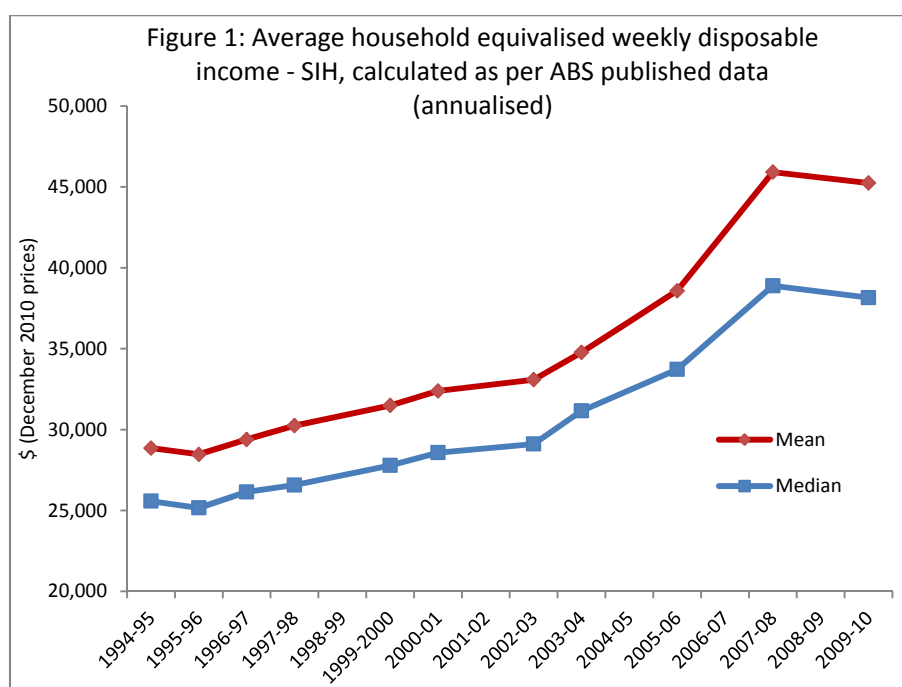
Figure 2 presents an overall picture of inequality as measured by the Gini coefficient. It shows a decline in inequality between 1994-95 and 1996-97, followed by rising inequality up to 2000-01 and then declining inequality to 2003-04, with the decline between 2002-03 and 2003-04 very sharp. From 2003-04 to 2007-08, measured inequality rose very rapidly, with the Gini coefficient increasing from 0.293 to 0.335, a 14 per cent increase. There was then a decline in the Gini coefficient to 0.328 in 2009-10, following the Global Financial Crisis (GFC).

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that there is no 'top-coding' of income variables, and the ABS claims perturbation '…disguises individual values without affecting the statistical validity of aggregate data.' (ABS 2011b, p.104).

Figure 2: Gini coefficient for household equivalised weekly disposable income - SIH, calculated as per ABS published data
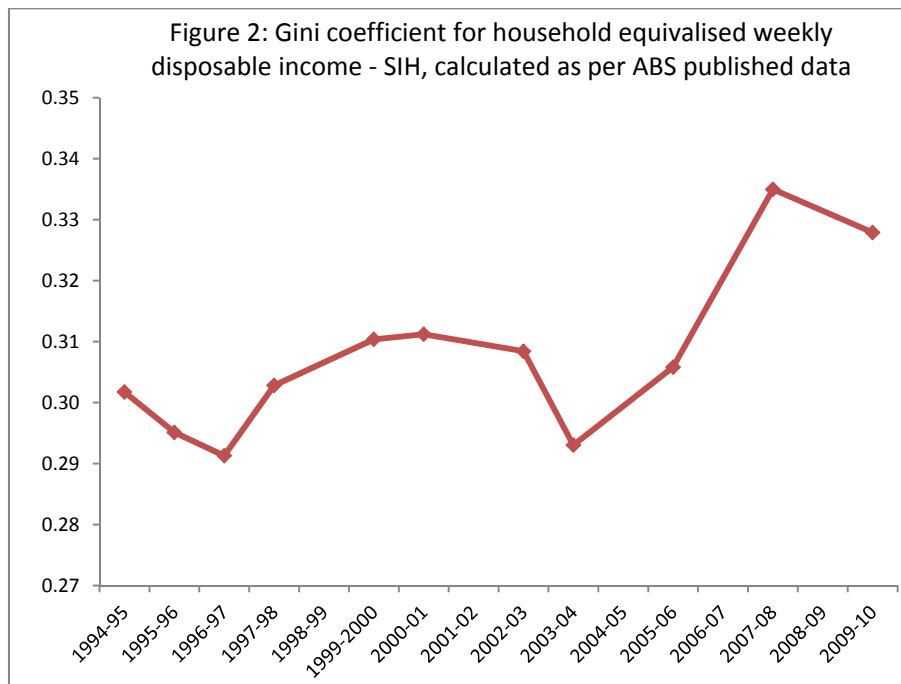
Figure 3 examines the ratio of the 90th percentile to the median (90-50) and the ratio of the median to the 10th percentile (50-10). Both of these ratios increase between 1996-97 and 2002-03, decline sharply in 2003-04 and then rise dramatically between 2003-04 and 2007-08. In 2009-10, the 90-50 percentile ratio continued to rise, while the 50-10 percentile ratio declined. Over the full period, both ratios increased, so the increase in inequality cannot be represented as solely due to greater income growth at the top of the income distribution: the top end of the distribution (as represented by the 90th percentile) has increased relative the middle of the distribution; but the middle of the distribution has also increased relative to the bottom end of the distribution (as represented by the 10th percentile).

Figure 3: Percentile ratios for household equivalised weekly disposable income - SIH, calculated as per ABS published data

Table 1 presents statistics on the changes in distributional features over sub-periods along with 95 per cent confidence intervals derived from 1,000 bootstrap samples. The top panel examines the period from 1994-95 to 2000-01 and the second panel examines the period from 2000-01 to 2009-10. Growth in average incomes was stronger in the 2000s, but it is clear that the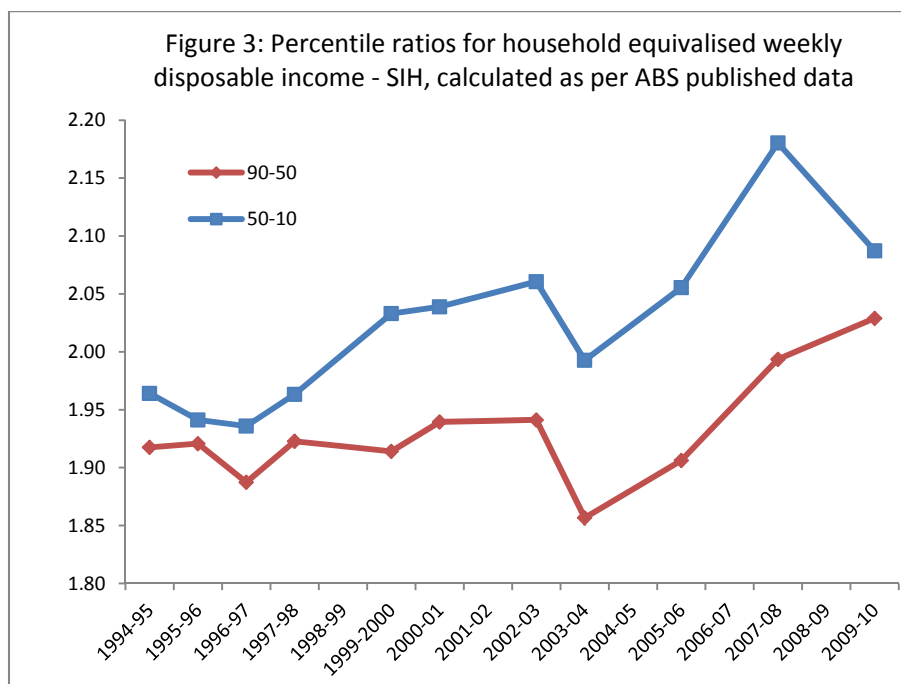 ABS data show statistically significant and large net rises in inequality over both sub-periods. The Gini coefficient had an average annual increase of 0.5 per cent between 1994-95 and 2000-01 and 0.6 per cent between 2000-01 and 2009-10, although the nature of the increase in measured inequality differs somewhat for the two sub-periods. In the earlier of the two periods, most of the increase appears to have arisen from increased inequality at the lower end of the income distribution—indeed, the growth in the ratio of the 90th percentile to the median is not statistically significant. In the latter of the two periods, by contrast, more of the growth appears to have come from increased inequality at the upper end of the distribution, since the average annual change in the 90-50 percentile ratio was 0.6 per cent, compared with 0.3 per cent for the 50-10 percentile ratio.

Table 1: Changes in the distribution of household equivalised weekly disposable income—SIH, calculated as per ABS published data (December 2010 prices)

	Mean ($, annualised)	Median ($, annualised)	Gini coefficient	90-50 percentile ratio	50-10 percentile ratio	5th percentile ($, annualised)	95th percentile ($, annualised)	99th percentile ($, annualised)
Level 1994-95	$28,855	$25,575	0.302	1.918	1.964	$10,641	$57,969	$84,165
Change 1994-95 to 2000-01								
Total change	$3,532	$3,002	0.009	0.022	0.075	$568	$7,882	$17,746
	[3,101, 3,963]	[2,575, 3,427]	[0.003, 0.016]	[-0.016, 0.060]	[0.041, 0.109]	[61, 1,074]	[6,460, 9,305]	[13,005, 22,487]
Average annual change	1.9%	1.9%	0.5%	0.2%	0.6%	0.9%	2.1%	3.2%
	[1.7, 2.2]	[1.6, 2.1]	[0.2, 0.9]	[-0.1, 0.5]	[0.3, 0.9]	[0.1, 1.6]	[1.8, 2.5]	[2.4, 4.0]
Change 2000-01 to 2009-10								
Total change	$12,859	$9,581	0.017	0.089	0.048	$3,900	$31,153	$56,201
	[12,313, 13,405]	[9,071, 10,091]	[0.010, 0.023]	[0.054, 0.125]	[0.016, 0.081]	[3,397, 4,403]	[29,231, 33,075]	[46,494, 65,907]
Average annual change	3.7%	3.2%	0.6%	0.5%	0.3%	3.2%	4.3%	4.8%
	[3.6, 3.9]	[3.1, 3.4]	[0.3, 0.8]	[0.3, 0.7]	[0.1, 0.4]	[2.9, 3.6]	[4.1, 4.5]	[4.1, 5.5]
Change 2003-04 to 2007-08								
Total change	$11,141	$7,735	0.042	0.137	0.188	$1,926	$29,411	$70,821
	[10,517, 11,764]	[7,208, 8,261]	[0.036, 0.048]	[0.095, 0.179]	[0.154, 0.221]	[1,625, 2,227]	[27,294, 31,528]	[60,175, 81,468]
Average annual change	7.2%	5.7%	3.4%	1.8%	2.3%	3.4%	9.3%	13.9%
	[6.8, 7.6]	[5.3, 6.1]	[2.9, 3.9]	[1.3, 2.3]	[1.9, 2.7]	[2.9, 4.0]	[8.7, 9.9]	[12.1, 15.5]

Notes: Numbers in square bracket are 95 per cent confidence intervals, derived from 1,000 bootstrap samples.

The changes between 1994-95 and 2000-01 presented in Table 1 mask the decline between 1994-95 and 1996-97 and the sharpness of the rise in inequality from 1996-97 to 2000-01 evident in Figures 2 and 3. Similarly, the changes between 2000-01 and 2009-10 mask the downward changes between 2000-01 and 2003-04 and between 2007-08 and 2009-10, and the sharpness of the rise between 2003-04 and 2007-08. The bottom panel of the table focuses on the 2003-04 to 2007-08 period and highlights the sharp rise in measured inequality over this period—which, as is detailed in Section 3, is when most of the changes to methods and income concept occurred. The average annual increase in the Gini coefficient over this four-year period was an extraordinary 3.4 per cent. There is also a strong ordering of income changes by location in the income distribution across the entire distribution: the 5th percentile increased by 3.4 per

cent per annum, the median by 5.7 per cent, the 95th percentile by 9.3 per cent and the 99th percentile by 13.9 per cent.

The broad message from Figures 1 to 3 and Table 1 is that the period between 1994-95 and 2009-10 has been one of sustained growth in real household incomes, which has occurred across the distribution. Growth has, however, been stronger the higher the location in the income distribution, and correspondingly inequality measures such as the Gini coefficient and the 90-50 and 50-10 percentile ratios have increased substantially.

3. Changes to the ABS Survey of Income and Housing between 1994-95 and 2009-10

The ABS has conducted the Survey of Income and Housing eleven times between 1994-95 and 2009-10, each survey producing household income data for two reference periods: the 'current week' and the 'previous financial year'. All of the surveys were conducted over twelve-month periods running from 1 July to 30 June of the next year and all are broadly similar in scope and content. There have, however, been a number of changes to survey methods and income concept over the period which reduce the comparability of the data across surveys. Most of these changes were introduced in the three surveys conducted between 2003-04 and 2007-08. Indeed, in recent ABS publications (for example, in ABS (2011a)), notes to the tables indicate that, despite subsequent revisions to estimates for earlier surveys, estimates from the 2003-04 and 2005-06 surveys are not comparable with estimates for earlier surveys, and estimates from the 2007-08 and 2009-10 surveys are likewise not comparable with estimates from earlier surveys.[7]

Table 2 summarises the main changes to the SIH up to the 2009-10 survey. Most of the changes are documented in various issues of the ABS publication *Household Income and Income Distribution* (Catalogue No. 6523.0), although some are only documented in user guides and technical papers for the public-use unit record data (ABS, 2006, 2007b, 2009b, 2009c, 2011b). A number of the changes have directly impacted on measured income. Changes were most profound for current weekly income measures, but significant changes were also made in respect of annual income. Furthermore, a number of other changes in survey methods and administration could have impacted on income distribution estimates.

Wage and salary income

Several changes have been made by the ABS with respect to wage and salary income. Since 2003-04, the SIH questionnaire has contained questions on salary sacrificed income, a form of non-cash benefits.

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[7] In the 2007-08 publication of 6523.0 (ABS, 2009a), some errors in calculating tax offsets in 2005-06 were rectified (resulting in revisions to published disposable income estimates for 2005-06). The public-use unit record data was reissued and so this does not affect analysis presented here. Similarly, for the 2009-10 publication of 6523.0 (ABS, 2011a), errors in processing the 2007-08 data were corrected, and a corrected unit record data file was issued, which was used for the analysis presented in this paper.

However, it was only from 2005-06 that the current household disposable income variable in the public-use unit record data explicitly included salary sacrificed amounts in wage and salary estimates. Prior to 2005-06, only salary sacrificed income that was 'by default' included in reported wage and salary income—that is, included when the respondent is given no directions on whether to include or exclude salary sacrificed income—was included in measured income, although it is possible to add the salary sacrificed amounts not included by respondents to the 2003-04 current income estimates. ABS (2007a) reports that, in the 2003-04 and 2005-06 SIH, approximately one-third of salary sacrificed income was not captured when respondents were not explicitly directed to include salary sacrificed income. However, mean household current weekly salary sacrificed income was shown to be only $21 in 2003-04 and $29 in 2005-06, and thus the mean value of excluded salary sacrificed income was only $7 in 2003-04 and just under $10 in 2005-06. Nonetheless, the addition of this income was shown to have a discernible effect on the distribution of equivalised weekly income, increasing the mean and Gini coefficient by 1 per cent in both survey years.

For annual wage and salary income, there were no changes in relation to salary sacrifice until the 2007-08 survey. In 2005-06, the relevant wage and salary income question administered was 'Last financial year, what was your total income from all jobs before any tax was deducted? The amount should be listed on the 'payment summary' provided by your employers.' In 2007-08, the same question was administered, but with the following additional direction read out to all respondents employed in the preceding financial year: 'Please include all salary sacrificed amounts.' Thus, salary sacrificed amounts are included in annual income from the 2007-08 survey, but are likely to be partially excluded in the earlier surveys.

From 2007-08, current wage and salary income now included all payments received as a result of current and former employment. In addition to the regular and recurring cash receipts previously included, bonuses, termination payments (the annual value of which is capped at three months' pay, based on the greater of the respondent's reported wage and salary income and average weekly earnings) and payments for irregular overtime were now included. This required administration of additional questions.

Business and investment income

From 2003-04, current income from unincorporated business and investments was measured using respondents' estimates of expected income in the current financial year, whereas previously income from this source was derived solely from information reported for the previous financial year. Thus, for example, any business commencing operations in the current year was assumed to have zero income. Depending on the inherent inter-temporal variability of income of unincorporated businesses at the household level and its covariance with household income from other sources (for example, low business income may be offset of increased wage and salary income), and also depending on economy-wide changes in unincorporated income from one financial year to the next, this has significant potential to impact on the measured income distribution. ABS (2005, p.45) states that 'The new methodology has particularly resulted in far fewer

households being recorded with current business incomes that are negative, zero or only slightly positive.'

but the ABS does not quantify the impact on income distribution estimates.

Table 2: Major changes to the ABS Survey of Income and Housing, 1994-95 to 2009-10

	Period of effect (survey year)							
	'94-95 to '97-98	1999-2000	'00-01	'02-03	'03-04	'05-06	'07-08	'09-10
Changes directly impacting on (current) <u>weekly</u> income measures								
Wage and salary income: The survey instrument included questions on salary sacrificed income received by employees, allowing explicit inclusion of salary sacrificed income in employment income.					▓	▓	▓	▓
Business and investment income: Current income from unincorporated businesses and from investments was measured using respondents' estimates of expected income in the *current* financial year. Previously, estimated income from these sources was based solely on reported values in the *previous* financial year.					▓	▓	▓	▓
Investment income: Dividend imputation credits were explicitly included as a result of changes to the survey instrument (i.e., respondents asked to include them).					▓	▓	▓	▓
Wage and salary income: Salary sacrifice explicitly included.						▓	▓	▓
Wage and salary income: Current employment income included irregular payments such as bonuses, termination payments (up to a limit), and payments for irregular overtime.						▓	▓	▓
Business and investment income: Income received as a silent partner and some private trust income were classified as investment income rather than unincorporated business income.								▓
Government benefits: Rent Assistance was added to government benefits where it was identified that it had not already been included in reported government benefits.*								▓
Other income: A wider range of data on financial support receipt from non-resident family members was included, including goods and services received (e.g., rent, education, food, clothing, car registration, utilities).								▓
Other income: Workers' compensation lump sum payments included (up to a limit).								▓
Changes directly impacting on <u>annual</u> income measures								
Investment income: Dividend imputation credits were explicitly included as a result of changes to the survey instrument.					▓	▓	▓	▓
Wage and salary income: The survey instrument included an explicit direction for employees to include salary sacrificed income.								▓
Business and investment income: Income received as a silent partner and some private trust income were classified as investment income rather than unincorporated business income.								▓
Other income: A wider range of data on financial support receipt from non-resident family members was included, including goods and services received (e.g., rent, education, food, clothing, car registration, utilities).								▓
Other income: Termination payments and workers' compensation lump sums added (up to a limit).								▓
Other changes potentially impacting on inequality inferences								
Respondents given prior written advice that income data to be collected.				▓	▓			▓
Moved from pen-and-paper interviewing to computer-assisted interviewing.					▓			▓
Change in sample frame: Shifted from the outgoing rotation of the Monthly Population Survey to a new sample.					▓			▓
Income obtained for immigrants who arrived within the last year. Previously, income had not been obtained.					▓			▓
SIH integrated into the Household Expenditure Survey.						▓		▓
Household wealth data collected.						▓		▓
Households with any non-respondents treated as non-responding. In other years, if the non-respondent was not 'significant', values were imputed.						▓		
Slight increase in survey scope to include some non-remote Indigenous communities.						▓	▓	▓
Benchmarks/weighting: Detail of age categories increased.							▓	▓
Benchmarks/weighting: Detail of age categories further increased.								▓
Benchmarks/weighting: Included the value of government benefits.		▓						▓
Sample size (number of households)	c. 7,000	6,637	6,786	10,211	11,361	9,961	9,345	18,071

Notes: * There was no change in respect of collection of *annual* information on government benefits. Note that in its publications the ABS has ex post incorporated some changes into estimates for earlier surveys.

The SIH questionnaire was also changed in 2003-04 in respect of dividend income received, both in the current week and in the previous financial year. Interviewers were required to explicitly ask respondents to include dividend imputation credits in reported dividend income; prior to the 2003-04 survey, this direction was only included in interviewer instructions and as a result would only arise in the event that the respondent queried the interviewer about the treatment of imputation credits. Since imputation credits are not a direct cash transfer to recipients, but rather act to reduce their income tax liability, it seems likely that many respondents did not include them in reported dividend income prior to 2003-04. Income taxation statistics (see, for example, Australian Taxation Office (2013), Table 10) show dividend imputation credits are approximately 40 per cent of declared dividend income (excluding imputation credits), so this could have a sizeable impact on incomes of dividend recipients.

A further slight change to the survey instrument from 2005-06 was to ask about interest earnings of 'bank accounts' rather than 'deposits at a bank or other financial institution'. This change is not listed in Table 2, since it is unlikely to significantly affect reported incomes, although presumably it was introduced to improve accuracy and completeness of reporting.

Further changes were introduced in 2007-08. Interest paid on borrowings to finance share and unit trust investments was now netted out of income earned from these sources, for both current and annual income. Income received as a silent partner and some private trust income was classified as investment income rather than business income. Reclassifying income in this manner should not in principle affect total income, but the ABS (2009c, p.29) believes that the changes to the questionnaire to effect these changes led to improved reporting of income from these sources. In particular, additional questions were included on silent partnership income and trust income, in respect of both the current period and the previous financial year.

Government benefits

From 2005-06, Family Tax Benefit received as a lump sum or paid through the tax system was added to gross income. Previously, Family Tax Benefit received in this way had only been included in disposable income, but not gross income (essentially by reducing the estimated income tax payable for those eligible for the benefit). This change should therefore not have affected disposable income.

Beginning in the 2007-08 survey, Rent Assistance, a subsidy for low-income renters of private housing, was now imputed by the ABS and added to current government benefits where it was identified that it was not included in reported government benefits. To effect this change, additional questions on receipt of Rent Assistance were added to the questionnaire. These questions directly ask whether Rent Assistance is received and further ask whether this was included in reported government benefits. This change would tend to boost incomes of low-income households. No changes have been made in respect of annual government benefits, seemingly on the assumption that respondents include Rent Assistance when

reporting annual benefit income. This may be because many respondents refer to the Payment Summary issued by Centrelink when reporting annual benefit income.

Other income

From the 2007-08 survey, lump sum workers' compensation payments were now included in income, for both current and annual income measures (with the annual value capped at the equivalent of 52 weeks at average weekly earnings if no wage and salary income was reported, and otherwise capped at three months' pay, based on the greater of the respondent's reported wage and salary income and average weekly earnings). Further, a wider range of data on financial support receipt from non-resident family members (both current and annual) was included from the 2007-08 survey. In addition to regular payments previously collected, other forms of financial support added included goods and services received (e.g., rent, education, food, clothing, car registration, utilities). Capital transfers, such as inheritances and the purchase of a car, were still excluded. All income measures exclude 'capital transfers'. Both of these changes act to increase mean income, while effects on inequality are uncertain.

Other changes

Changes other than to the income variables themselves also potentially impacted on income estimates. In some respects, these are more important, because the ABS has released different versions of income variables which attempt to create consistent income variables for at least significant subsets of the SIH survey period. These consistent series do not, however, account for changes in sample frame, survey methods and other aspects not directly related to income.

In the April 2002 issue of *Australian Economic Indicators*, it is noted that 'Commencing with the 2002-03 SIHC, prior written advice is once again being supplied to all households selected for SIHC interviews so that they can be prepared with the appropriate documentation at interview' (ABS, 2002, p. 4). This is a potentially important change in field methods, which one might expect to increase measured inequality if it improves reporting accuracy. Likewise, the introduction of computer-assisted personal interviewing (CAPI) in 2003-04 may have improved the quality of income data, for example, because it allows for automated identification and querying of contradictory or implausible responses. Ryscavage (1995) and Weinberg (2006) find evidence of just such an effect from the introduction of CAPI to the US Current Population Survey in 1993, where they found it particularly increased measured incomes of high-income households.

Many of the other changes have more ambiguous potential effects. The shift from the outgoing rotation of the Monthly Population Survey (MPS) to a new independent sampling frame from the 2003-04 survey may have affected response bias. Imputation procedures also changed as a result of this switch because of the absence of information collected in the MPS to use as a basis for imputation. Also beginning in 2003-04, details of previous financial year income were collected from people who had only arrived in Australia in

the current financial year; previously it had not been collected for these people. The previous practice will have artificially lowered equivalised incomes of households containing recently arrived immigrants, because the immigrant contributed no measured income to the household, but was included in the equivalence scale. A further change in 2003-04 was the collection, for the first time as part of the SIH, data on assets and liabilities (as part of wealth data collection). This may have improved the quality of reporting of associated income streams in the 2003-04 survey, and also subsequently in the 2005-06 and 2009-10 surveys, when wealth data was again collected. The SIH was also integrated with the Household Expenditure Survey (HES) in 2003-04 and 2009-10. As the ABS notes, this may affect response bias, particularly since non-response is greater in these two survey years, which the ABS attributes to the higher respondent burden in those years. Integration may also have impacted on responses to income questions, although this effect is likely to be small.

From the 2005-06 survey onwards, the scope of the SIH increased slightly to include people living in Indigenous communities unless they were living in very remote areas. Previously, such communities were out of scope. Given people in Indigenous communities are likely to have low incomes, this slight increase in scope would tend to lower mean household income and increase measured inequality, although the effects are likely to be negligible given the small number of households involved. In 2005-06, and only in that survey, imputation procedures changed. All households with one or more non-respondents were treated as non-responding, whereas in all previous and subsequent surveys, values were imputed for non-respondents as long as none of the non-respondents was 'significant'. Also particular to the 2005-06 survey is that the final quarter of the financial year had a 25 per cent smaller sample size than the other quarters. It is not clear why the sample size was reduced in that quarter, but to the extent that the final quarter differs from other quarters this would have affected current income estimates for that year. It may also have affected annual income estimates, given the longer average recall-period for final-quarter respondents, for whom the previous financial year would have ended 9 to 12 months prior to the date of interview.

Sample sizes have also varied across the eleven surveys, although of course this should not of itself impact on comparability, other than to affect the precision with which inequality can be measured. Weighting and benchmarking procedures have changed slightly from survey to survey. In the 1999-2000, 2000-01 and 2009-10 surveys, the samples were benchmarked against administrative data on government benefits and sample weights were adjusted accordingly. In the 2005-06 survey, and then again in the 2007-08 survey, progressively more detailed age benchmarks were adopted. In addition, the census benchmarks are changed as new census data becomes available. Thus, for example, the surveys from 2000-01 to 2003-04 used the Census 1996 benchmarks, the 2005-06 survey used the Census 2001 benchmarks and the 2007-08 and 2009-10 surveys used the Census 2006 benchmarks.

The above changes have predominantly been motivated by a desire to improve household income measures (although fieldwork costs are no doubt another consideration), and almost certainly have succeeded in achieving this. The income concept is more consistent with current international standards, as embodied by the Canberra Group's recommendations (see United Nations, 2011), and the modifications to the survey instruments and other changes to survey methods have facilitated better capture of the various components of household income. The major cost of these improvements, however, is that measures of household disposable income are not comparable over time: each of the surveys conducted from 2003-04 to 2007-08 is not strictly comparable with any of the surveys that preceded it.

In an attempt to address this problem, the recent public-use unit record files produced by the ABS contain multiple versions of several income variables. These variables are intended to provide consistent measures of income, although no consistent current-income measure is available over the entire 1994-95 to 2009-10 survey period. The upper panel of Table 3 summarises the notionally consistent disposable income series available based on the alternative income measures. The table indicates that, up until 2005-06, the one annual income measure provided by the ABS is comparable up to that point in time, after which a new income series was commenced. For current income, the table implies a single consistent measure up until 2003-04, with new income series commencing in 2005-06 and in 2007-08. The original (first) series was not produced by the ABS in 2009-10, while the series commencing in 2005-06 and 2007-08 have been produced up to the end of the survey period.

While each of the two annual series and the three current weekly series is indeed likely to produce more internally consistent income measures, there are three main problems with them. First, as noted, each of the current weekly income series is only available for a subset of the survey period, so it is not possible to accurately infer what has happened over the total survey period. Second, the series do not account for all changes in income concept and collection methods, so the income measure is not in fact entirely constant within each series. Third, and most importantly, the impacts of other (broader) changes to survey methods are not eliminated. In particular, they do not account for the effects of the introduction of computer-assisted interviewing in 2003-04, moving to a new sampling frame in 2003-04, integration with the HES in 2003-04 and 2008-09, inclusion of household wealth questions in 2003-04, 2005-06 and 2009-10, collection of previous financial year income from new immigrants from 2003-04, changes in benchmarks for weights across surveys, and changes in imputation procedures in 2003-04, 2005-06 and 2007-08.

There is therefore no strict comparability across the surveys from 2002-03. However, abstracting from the broader survey changes, it is possible to identify three annual income series and four current weekly income series that are 'relatively' internally consistent. These are listed in the lower panel of Table 3. The difference from the ABS-defined consistent series is that income calculated on the 'pre-2003-04' basis is not considered comparable with income calculated on the '2003-04' basis. This is because the changes introduced in 2003-04 with respect to investment and business income, the inclusion of recent-immigrant

income, the move to a new sampling frame and associated changes in imputation methods, and the integration with the HES and the associated drop in response rates, and the introduction of CAPI collectively represent significant changes.

It should be emphasised, however, that there remain important inconsistencies within each of the three annual series and each of the four current weekly series, especially over the 2002-03 to 2007-08 period. Changes in survey scope, sample size, weighting scheme and imputation methods, and changes with respect to integration with the HES and collection of wealth data, will all potentially impact on income inequality estimates, and at least several of these occur within each of the series. Hence, they are referred to as 'relatively' consistent series.

Table 3: 'Consistent' household disposable income series available in the SIH unit record data

Income series	Surveys for which the series is available
ABS-defined consistent series	
Previous financial year income	
1. Calculated on the 'pre-2007-08' basis	1994-95 to 2009-10 (all 11 surveys)
2. Calculated on the '2007-08' basis	2007-08 to 2009-10 (2 surveys)
Current weekly income	
1. Calculated on the 'pre-2005-06' basis	1994-95 to 2007-08 (10 surveys)
2. Calculated on the '2005-06' basis	2005-06 to 2009-10 (3 surveys)
3. Calculated on the '2007-08' basis	2007-08 to 2009-10 (2 surveys)
Author's 'relatively consistent' series	
Previous financial year income	
1. Calculated on the 'pre-2003-04' basis	1994-95 to 2002-03 (7 surveys)
2. Calculated on the '2003-04' basis	2003-04 to 2009-10 (4 surveys)
3. Calculated on the '2007-08' basis	2007-08 to 2009-10 (2 surveys)
Current weekly income	
1. Calculated on the 'pre-2003-04' basis	1994-95 to 2002-03 (7 surveys)
2. Calculated on the '2003-04' basis	2003-04 to 2007-08 (3 surveys)
3. Calculated on the '2005-06' basis	2005-06 to 2009-10 (3 surveys)
4. Calculated on the '2007-08' basis	2007-08 to 2009-10 (2 surveys)

Significantly, the ABS regards weekly income as preferable to annual income for analysis of the distribution of household income. The stated reasons for this preference (see, for example, ABS, 2011a, p. 56) are that estimates for current weekly income are more up to date, appear to be more accurately reported for government pensions and allowances, and because annual estimates relate to a 'quasi household', since they are constructed from personal incomes of people currently in the same household, but who may not have all been in the same household for the whole of the previous financial year. As a consequence, the ABS publication *Household Income and Income Distribution* (Catalogue No. 6523.0) presents estimates only for weekly income. However, for the purposes of time series comparisons over the 2000s, the annual series is clearly superior to the weekly series, since the changes to income concept and survey methods have been significantly more profound for current weekly income than for annual income. Moreover, for income distribution analysis, the annual time-frame is arguably a more natural accounting period, particularly since some sources of income are lumpy or more easily measured over an annual time frame, such as business

and investment income, and also government benefits such as Family Tax Benefit, which have an annual reconciliation and a lump sum component.
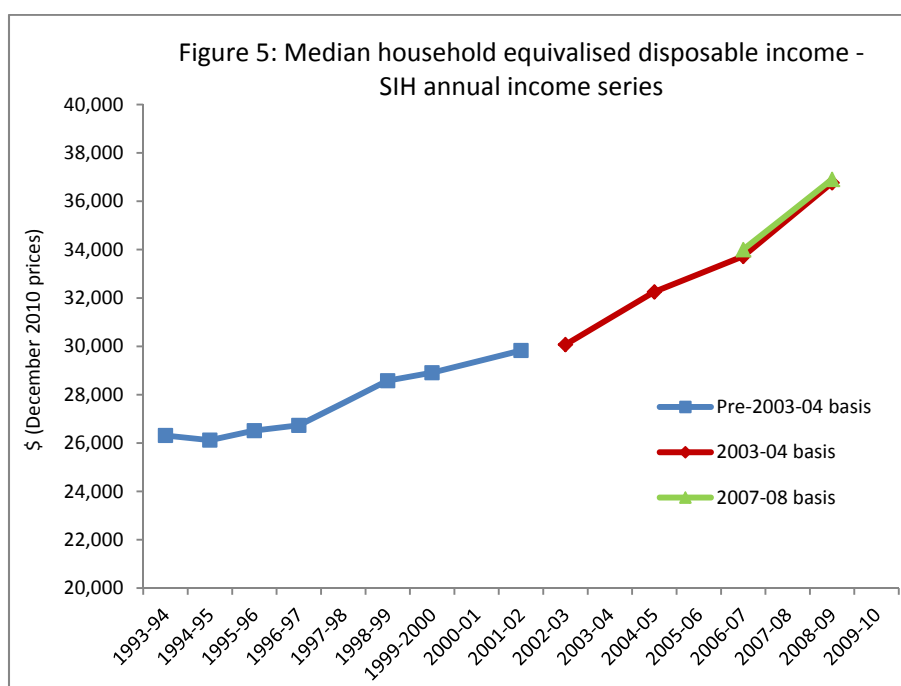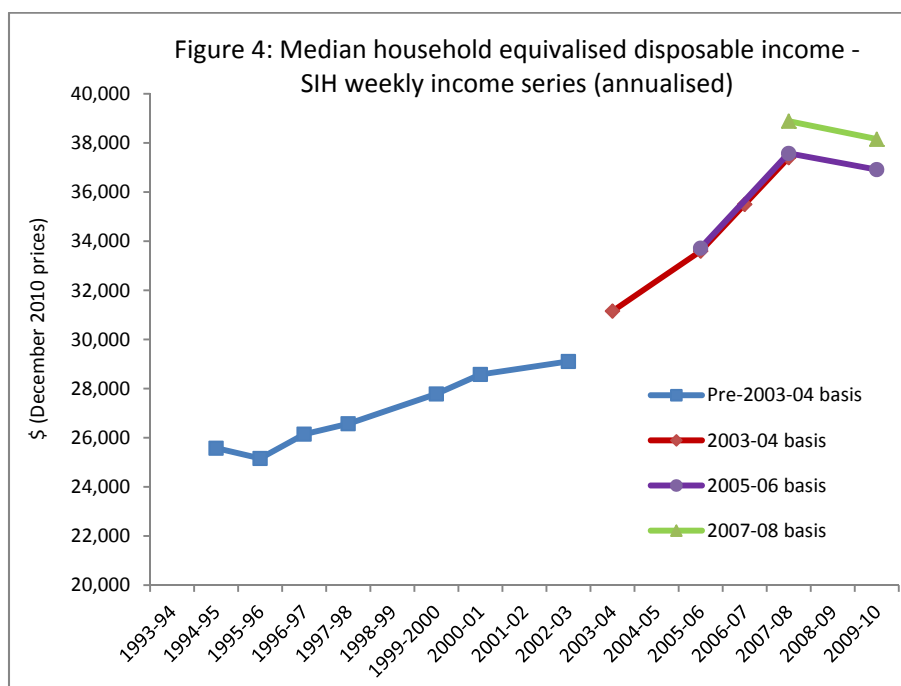
4. Estimates of inequality using 'comparable' ABS income series

Figures 4 and 5 present medians, and Figures 6 and 7 present Gini coefficients, for the seven income distribution series listed in the lower panel of Table 3 (and are labelled accordingly). As in Section 2, the income variable is household equivalised disposable income at December 2010 prices, negative disposable incomes are set to zero, and the population comprises all residents (including children) of private dwellings other than military personnel and people living in remote areas. For both the median and the Gini coefficient, it is clear that the direct effects of the changes introduced in the 2007-08 survey are significant for the current weekly estimates, but negligible for the annual estimates. For the weekly estimates, the annualised median is approximately $1,300, or 3.5 per cent, higher when calculated on the 2007-08 basis than when calculated on the 2005-06 basis, while the Gini coefficient is approximately 0.015, or 5 per cent, higher. The 2005-06 changes, by contrast, which are relevant only to the weekly income estimates, do not have very large effects on the median or Gini coefficient.

The effects of the 2003-04 changes are uncertain, because there is no survey in which income measured on both the pre-2003-04 basis and the 2003-04 basis are available. However, the paths of the graphs of both the median and Gini coefficient are highly suggestive of substantial effects for current weekly income and minimal effects for previous financial year income. The median for weekly income rises faster between 2002-03 and 2003-04 than it was rising before 2002-03 or after 2003-04, while the Gini coefficient for weekly income falls sharply between 2002-03 and 2003-04, whereas prior to 2002-03 it was falling slowly, and after 2003-04 it was rising rapidly. For annual income, by contrast, the changes in the median and Gini coefficient between 2002-03 and 2003-04 are consistent with the trends both before and after the break in series. This would seem to further support the contention that the weekly series calculated on the pre-2003-04 basis is not comparable with the weekly series calculated on the 2003-04 basis.

The evidence in Figures 4 to 7 is consistent with the expectation, based on the changes described in Section 3, that weekly estimates have been more greatly impacted by the changes in income concept than have the annual estimates. Indeed, if one believes that the effects of the income concept changes are completely captured by the differences between the series in the same year, it appears that inter-temporal comparisons can be validly made using any of the annual estimates across the entire period spanned by the SIH. However, as discussed in Section 3, the alternative series do not capture the effects of all changes made to the SIH. Moreover, there could potentially be indirect, or spillover, effects of changes—that is, reported values of some income components (e.g., cash wage and salary income) could change as a result of changes in the methods for collecting other income components (e.g., self-employment income) or as a

result of the collection of additional components (e.g., salary sacrifice). Nonetheless, the prima facie evidence from the figures is that annual estimates were not affected by the changes.

Figure 4: Median household equivalised disposable income - SIH weekly income series (annualised)

Figure 5: Median household equivalised disposable income - SIH annual income series

Figure 6: Gini coefficient for household equivalised disposable income - SIH weekly income series

Figure 7: Gini coefficient for household equivalised disposable income - SIH annual income series

Table 4 looks more closely at the direct effects of the changes in income concept or measure, comparing distributional measures across the alternative household disposable income measures produced in the same survey. For weekly income, it is possible to compare two income concepts in the 2005-06 survey (2003-04 basis and 2005-06 basis), three income concepts in the 2007-08 survey (2003-04 basis, 2005-06 basis and 2007-08 basis), and two income concepts in the 2009-10 survey (2005-06 basis and 2007-08 basis). For annual income, it is possible to compare two weekly income variables in both the 2007-08 survey and the 2009-10 survey (2003-04 basis and 2007-08 basis).

These comparisons confirm the assessments based on inspection of Figures 3 to 7. Substantial effects are evident for the weekly income series, especially for the 2007-08 changes, while only minor effects of these changes are evident for previous financial year income. Particularly notable are the large effects of the 2007-08 changes on incomes at the upper end of the distribution. For example, in the 2009-10 survey, the changes resulted in the annualised value of the 99th percentile being $20,671 higher. The comparisons of the alternative measures of current weekly income in 2007-08 are also consistent with comparisons of mean equivalised income and the Gini coefficient reported in ABS (2009). For example, ABS (2009a) shows mean equivalised weekly income in 2007-08 increased by $42 (or $2,190 annualised), and the Gini coefficient increased from 0.317 to 0.331, due to the 2007-08 changes.

Table 4: Comparing SIH income distributions for different ABS income concepts

	Weekly series (annualised)				Annual series	
	2005-06	2007-08		2009-10	2006-07	2008-09
	05-06 basis minus 03-04 basis	05-06 basis minus 03-04 basis	07-08 basis minus 05-06 basis	07-08 basis minus 05-06 basis	07-08 basis minus 03-04 basis	07-08 basis minus 03-04 basis
Mean ($)	317	404	2,343	2,456	72	94
Median ($)	120	171	1,315	1,242	280	139
Gini coefficient	0.003	0.003	0.013	0.015	-0.001	0.000
90-50 percentile ratio	0.017	0.024	0.056	0.085	-0.018	0.001
50-10 percentile ratio	0.005	0.001	0.058	0.062	0.012	0.009
5th percentile ($)	7	38	113	308	-66	0
95th percentile ($)	1,553	1,198	7,777	8,067	-48	569
99th percentile ($)	2,797	1,646	13,800	20,671	2,903	722
Income shares (%)						
Bottom 50 percentiles	-0.2	-0.2	-0.8	-0.9	0.1	0.0
51st to 90th percentiles	0.0	0.0	-0.2	-0.2	0.1	0.0
91st to 95th percentiles	0.1	0.1	0.2	0.3	0.0	0.0
96th to 99th percentiles	0.1	0.3	0.4	0.5	-0.1	0.0
Top percentile	0.0	-0.2	0.5	0.3	0.0	-0.1
Poverty rate (%)	0.1	0.2	0.8	1.3	0.1	0.1

Notes: The income variable is household equivalised disposable income at December 2010 prices. '03-04 basis' is the income concept adopted by the ABS up until the SIH conducted in 2003-04; '05-06 basis' is the income concept adopted for the 2005-06 SIH, and '07-08 basis' is the income concept adopted for the 2007-08 and 2009-10 SIH. Poverty rate—Proportion of the population with equivalised income less than half the median equivalised income.

Table 4 shows effects directly attributable to changes in income concept, but doesn't account for 'spillover' effects on income components that are the same across income concepts. More importantly, the effects examined in Table 4 do not account for other changes in survey methods across surveys. There are strong indications that these changes have also impacted on the measures of the income distribution. Perhaps most notable is the drop in the Gini coefficient for weekly income between 2002-03 and 2003-04, which does not seem plausible, particularly given the absence of any evidence of such a drop in the Gini coefficient for annual income. The increase in inequality between the 2003-04 survey and the 2007-08 survey, for both weekly and annual income, also seems questionable. The Gini coefficient for the weekly series increased by 0.03, and for the annual series it increased by 0.04. These are very large increases over a four-year period and, at the very least, warrant closer scrutiny.

5. Comparisons with the HILDA Survey

Inferences on income distribution changes from the ABS SIH data clearly depend on the income measure used, and it is by no means clear which measure is correct. Even when income is measured on a reasonably consistent basis—albeit with uncertain effects of methodological and conceptual changes on income components in principle measured in a consistent way—the weekly and annual series tell quite different stories of the change in inequality between 2002 and 2010. Using 'pre-2007-08' income concepts for both annual and weekly measures, where documented changes are relatively minor, there is little net change in inequality for the weekly series, but a large net increase for the annual series. We therefore turn to an independent source of data on household income distribution, the HILDA Survey, to help ascertain what is likely to have happened to the income distribution.[8]

For these comparisons, the 'most comparable' weekly and annual SIH income variables are examined, which means that income calculated on the 2007-08 basis is not examined. Thus, for annual income, the pre-2003-04 basis is used up until the 2002-03 survey (2001-02 financial year) and the 2003-04 basis is used for the 2003-04 survey and all subsequent surveys. For weekly income, the pre-2003-04 basis is used up until the 2002-03 survey, the 2003-04 basis is used for the 2003-04 survey, and the 2005-06 basis is used for all subsequent surveys. Note that it is possible to use the 2003-04 basis for weekly income in the 2005-06 and 2007-08 surveys, but the evidence in the preceding section is that the direct effects of moving from the 2003-04 basis to the 2005-06 basis are relatively small, so the decision on whether to use the 2003-04 basis or 2005-06 basis in those survey years is in practice not critical.

The HILDA Survey is a nationally representative household panel study that commenced in 2001 with 13,969 respondents in 7,682 households. The initial sampling frame is very similar to the ABS Monthly Population Survey, and hence the SIH (Watson and Wooden, 2002). All members of households in the sample aged 15 years and over are interviewed annually, with children of sample members interviewed once they turn 15. Full details on sample selection and following rules, response rates, construction of population weights and information collected by the study are provided in Summerfield et al. (2012). The income information collected by the HILDA Survey data is, by design, very similar to that collected by the SIH. However, only for the previous financial year is a comprehensive income measure available, with current weekly income information restricted to wage and salary income and government benefit income.

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[8] The ABS also collects income data in various other household surveys that could in principle be used for comparison purposes. However, the surveys are conducted infrequently (at intervals of at least four years) and generally contain considerably less detailed income data. The Household Expenditure Survey (HES) does collect reasonably detailed income information and has been used by some studies to examine the distribution of income, but the two HES surveys conducted in the 2000s (2003-04 and 2009-10) were integrated with the SIH—that is, the one survey collected both the HES and SIH data. The Census is another potential source of income distribution data, collecting annual gross personal income of each household member which can be aggregated to produce a household income measure. However, income is collected only in broad categories that make the data unsuitable for detailed distributional analysis.

The income components collected are described in detail in Summerfield et al. (2012), while Wilkins (2009) describes the methods used to impute income taxes and derive disposable income.[9]

The HILDA Survey has not been immune to changes in survey methods and income concept. However, only two significant changes were made between 2001 and 2010, which were the switch to computer-assisted interviewing in 2009, and the collection of information on salary sacrificed wage and salary income from 2010. Moreover, in implementing these changes, there was a strong emphasis on preserving longitudinal consistency, particularly in the move to computer-assisted interviewing, with the electronic questionnaire largely replicating the previous paper-based questionnaire.
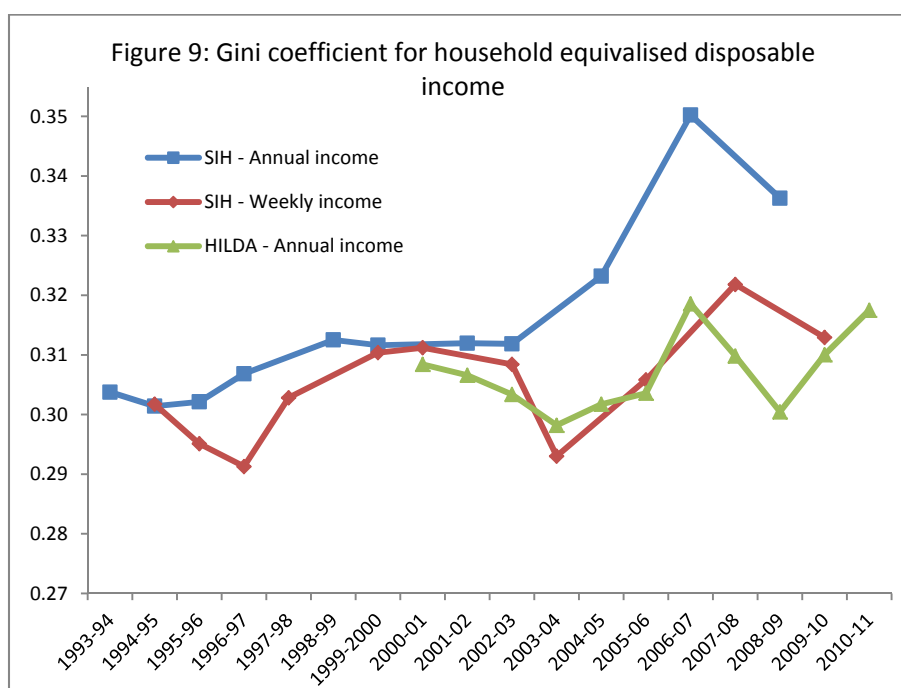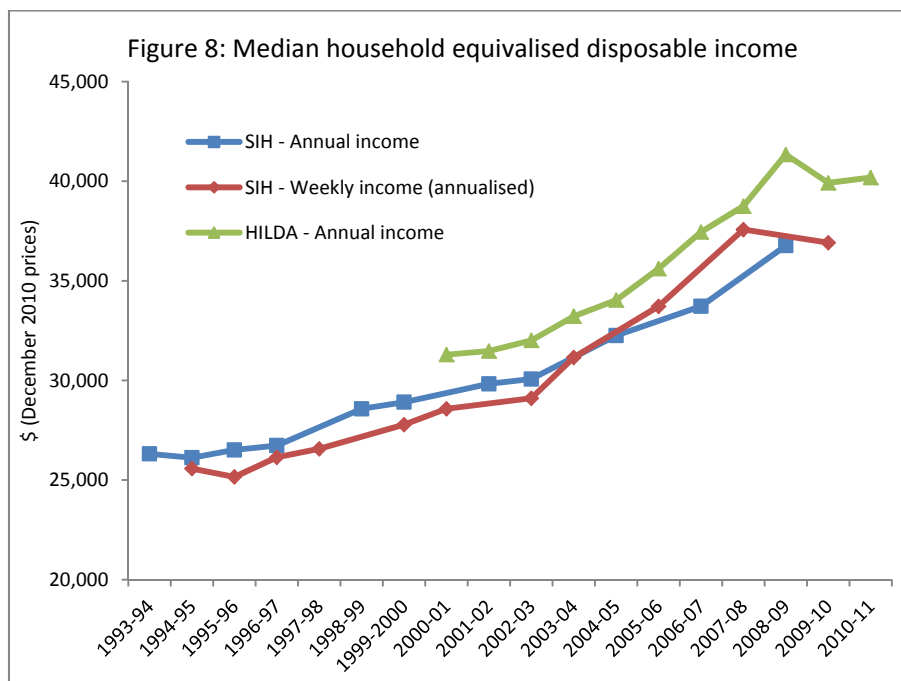
The household response rate of the HILDA survey in Wave 1 was 66 per cent, which is somewhat below the 80-85 per cent response rates achieved by the SIH. Moreover, the study suffers from panel attrition, although since Wave 4 this has been less than 5 per cent each year. A further source of declining representativeness of the HILDA Survey over time is that, by virtue of its longitudinal nature, immigrants arriving in Australia after 2001 have little chance of entering the sample. However, in 2011, a general sample top-up was conducted to address the declining representativeness of the HILDA survey, and reassuringly it is found that the 2010-11 income distribution is little-affected by the inclusion or exclusion of the top-up sample (Wilkins, 2013). Nonetheless, it is possible that the HILDA Survey provides a less accurate representation of the distribution of household income in Australia, which could be a source of differences from the SIH. For example, it is possible that attrition, while minimal, biases the HILDA Survey towards excessive stability in the income distribution.

Figures 8 to 11 compare the ABS income survey data with the HILDA Survey, respectively presenting the median, Gini coefficient, ratio of the 90th percentile to the median (90-50 percentile ratio) and ratio of the median to the 10th percentile (50-10 percentile ratio) for household equivalised disposable income. As in all preceding analysis, estimates are for the distribution of income among all individuals, including children, and incomes less than zero have been set equal to zero.

In principle, the annual SIH income series is more comparable to the HILDA series, since income in HILDA is obtained in respect of the preceding financial year, the same as for the annual SIH series. However, Figure 9 shows inequality, as measured by the Gini coefficient, is at a quite similar level for the HILDA and weekly SIH series, while the Gini coefficient for the annual SIH series is considerably higher than both of the other two series from 2004-05 onwards. The big difference between the weekly and annual SIH income series is in the change in inequality between 2002-03 and the next survey (2003-04 for the weekly series and 2004-05 for the annual series). Thereafter, changes in the Gini coefficient are in the same direction, although they are smaller in magnitude for the weekly SIH series. The Gini coefficient for the HILDA data follows a

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[9] Incomes of individuals and households with very high incomes are top-coded in the public-release unit record file, but the actual mean value of the top-coded cases is assigned to each top-coded case, and only 0.2 to 0.4 per cent of cases are top-coded. Effects on inequality estimates are therefore negligible.

similar path to the Gini for the weekly SIH series, but changes are more muted: both declines and rises are smaller in magnitude. Thus, somewhat unexpectedly, the SIH annual series is the outlier of these three series. It is not at all clear why this should be the case.

Figure 8: Median household equivalised disposable income

Figure 9: Gini coefficient for household equivalised disposable income

Figure 10: Ratio of 90th percentile to median for household equivalised disposable income

Figure 11: Ratio of median to 10th percentile for household equivalised disposable income
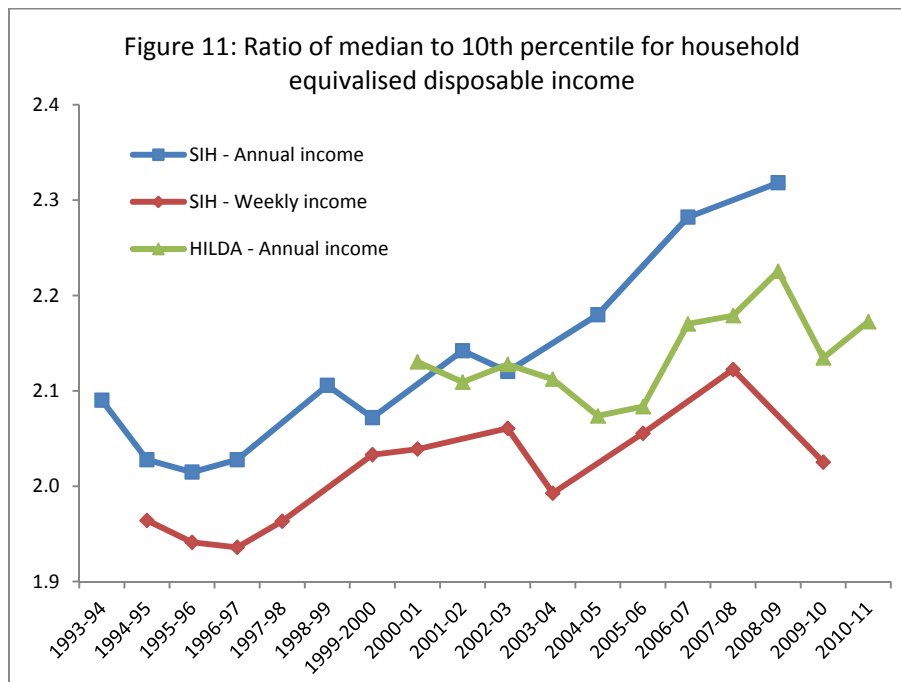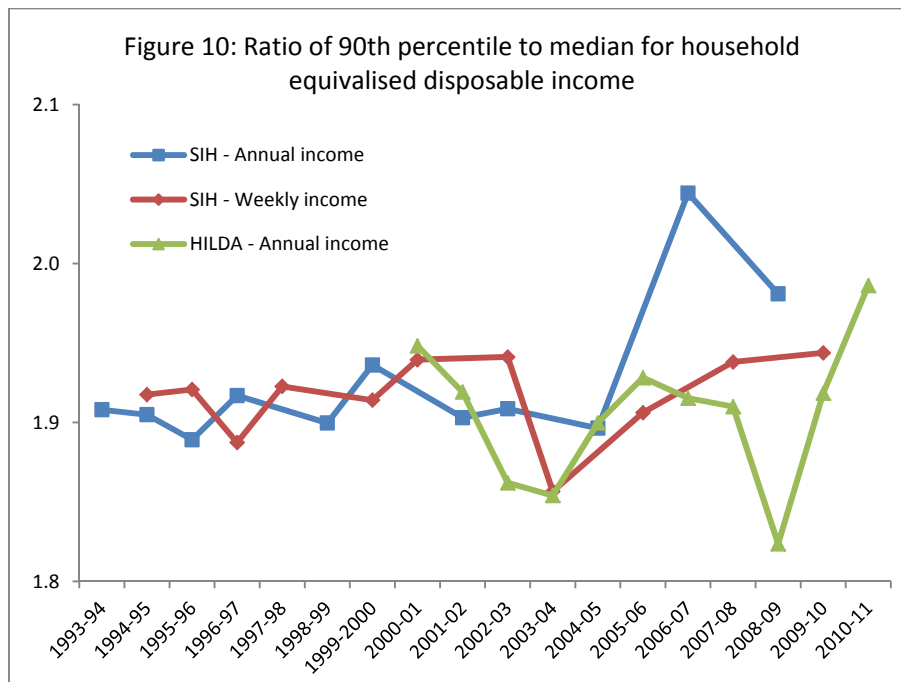
Figure 10 shows that, similar to the Gini coefficient, growth in the 90-50 percentile ratio over the mid-2000s was substantially greater for the SIH annual income series than for the SIH weekly income series and HILDA series, which again track each other more closely. Note that the decline in the 90-50 ratio in the SIH annual series and HILDA series in 2008-09 reflects the impact of fiscal stimulus payments made that year (evidence for which is presented in Section 8). This drop is not evident in the SIH weekly series because the SIH was not conducted in 2008-09. The 50-10 percentile ratio also grew more strongly for the SIH annual series, although the growth was sustained over the 2002-03 to 2008-09 period, whereas all of the growth in the 90-50 percentile ratio occurred between 2004-05 and 2006-07. That the SIH annual series 90-50 ratio was so much higher in the year that substantial changes were made to the income concept (2007-08, when

2006-07 annual income was obtained) is highly suggestive that the SIH was better capturing incomes of high-income households as a result of the changes made in 2007-08. Hence, although Figures 8 to 11 notionally apply the same (pre-2007-08) income concept across all years for the SIH annual series, there is circumstantial evidence that the changes nonetheless led to better capture of high incomes even when the income components included did not change.

Tables 5 and 6 present more detailed and precise comparisons of the HILDA and SIH income distributions for those survey periods that coincide. They present estimates of distributional features for the HILDA Survey, differences between HILDA estimates and SIH estimates for coincident periods, and also comparisons of changes over the 2000s: 2001-02 to 2008-09 for the SIH annual series and 2000-01 to 2009-10 for the SIH weekly series. Table 5 presents the mean, median, Gini coefficient, percentile ratios and the 5th, 95th and 99th percentiles, while Table 6 presents income shares by location in the income distribution (bottom 50 percentiles, the 51st to 90th percentiles, the 91st to 95th percentiles, the 96th to 99th percentiles and the top 1 per cent), as well as the income poverty rate, defined as the proportion of individuals with household equivalised disposable income less than half the median equivalised disposable income.

The HILDA Survey has higher mean and median incomes, and a consistently lower Gini coefficient and 90-50 percentile ratio than the two SIH series. The HILDA Survey also has a lower 50-10 percentile ratio than the annual SIH series, but a higher 50-10 percentile ratio than the weekly SIH series. That the weekly series has a relatively low 50-10 percentile ratio is somewhat surprising, since the opposite might be expected. For example, a household may temporarily have a low income because of an unemployment spell, which could be expect to apply to a proportion of households in any given week, but over the course of the year the household's income is likely to recover to at least some extent. This would translate to a higher 50-10 percentile ratio, given that the median in the weekly SIH series is broadly similar to the median in the annual SIH series.

Looking at the extremities of the income distribution, the 5th percentile is lower in the HILDA series than in the SIH annual series and similar to the SIH weekly series, while the 95th percentile is generally higher in the HILDA series. The 99th percentile is initially higher in HILDA (up to 2002-03 for the annual SIH series and up to 2003-04 for the weekly SIH series), is then lower than in both SIH series up to 2008-09, and is higher than the SIH weekly series in 2009-10. Income shares by location in the income distribution are similar for the HILDA and SIH weekly series, and in the early 2000s were similar for HILDA and the annual SIH series. However, from 2004-05, the HILDA Survey had a higher income share going to individuals in the bottom half of the distribution, and correspondingly a lower income share going to individuals in the top half of the distribution. The poverty rate tended to be lower in the HILDA Survey than in the annual SIH series, but higher than in the weekly SIH income series.

Table 5: Comparisons of SIH and HILDA income distribution statistics

	Mean ($)	Median ($)	Gini coefficient	90-50 percentile ratio	50-10 percentile ratio	5th percentile ($)	95th percentile ($)	99th percentile ($)
HILDA Survey								
2000-01	35,674	31,296	0.308	1.948	2.130	12,019	72,166	109,444
2001-02	35,695	31,479	0.307	1.919	2.109	12,241	72,046	107,411
2002-03	35,929	32,013	0.303	1.862	2.128	12,500	71,039	109,723
2003-04	36,940	33,226	0.298	1.854	2.112	13,185	74,453	109,905
2004-05	38,592	34,037	0.302	1.900	2.074	13,726	77,953	115,492
2005-06	40,587	35,610	0.304	1.928	2.084	14,376	83,340	122,258
2006-07	43,168	37,452	0.319	1.915	2.170	14,652	87,625	140,818
2007-08	44,045	38,749	0.310	1.910	2.179	14,590	89,853	142,141
2008-09	45,678	41,344	0.300	1.824	2.225	13,648	88,271	141,567
2009-10	45,760	39,921	0.310	1.918	2.135	15,122	93,127	150,256
HILDA Survey difference from SIH								
SIH annual income								
2001-02	2,128	1,651	-0.005	0.016	-0.033	-1,684	3,713	9,783
2002-03	2,030	1,942	-0.008	-0.047	0.007	-1,682	1,730	2,952
2004-05	2,022	1,785	-0.021	0.003	-0.106	-1,070	1,787	-4,427
2006-07	3,330	3,729	-0.032	-0.129	-0.112	-125	1,208	-9,732
2008-09	3,652	4,575	-0.036	-0.157	-0.093	-2,212	41	-2813
SIH weekly income - Annualised								
2000-01	3,287	2,720	-0.003	0.009	0.092	810	6,314	7,532
2002-03	2,844	2,906	-0.005	-0.079	0.067	955	4,879	10,716
2003-04	2,167	2,072	0.005	-0.003	0.120	-87	5,662	5,786
2005-06	2,005	1,891	-0.002	0.022	0.028	149	4,869	-857
2007-08	475	1,175	-0.012	-0.028	0.057	-495	-572	-18,999
2009-10	2,970	3,006	-0.003	-0.025	0.109	320	4,188	12,816
Changes 2001-02 to 2008-09								
HILDA	9,983*	9,865*	-0.006	-0.096*	0.116*	1,407*	16,225*	34,157*
SIH annual	8,458*	6,940*	0.024*	0.078*	0.176*	1,936*	19,896*	46,753*
Changes 2000-01 to 2009-10								
HILDA	10,085*	8,625*	0.002	-0.030	0.004	3,103*	20,961*	40,813*
SIH weekly	10,403*	8,339*	0.002	0.004	-0.014	3,592*	23,087*	35,529*

Notes: Income variable is household equivalised disposable income at December 2010 prices. * indicates the estimated change is significantly different from zero at the 5 per cent level, based on 1,000 bootstrap samples.

While levels differ to some extent, the HILDA and SIH weekly series shows similar distributional changes between 2000-01 and 2009-10, with both showing significant increases in average incomes but no significant net change in inequality. However, between 2001-02 and 2008-09, the SIH annual series shows a significant and sizeable increase in inequality, with the Gini coefficient increasing by 0.024, the 90-50 percentile ratio increasing by 7.8 percentage points and the 50-10 percentile ratio increasing by 17.6 percentage points. Moreover, the income share of the bottom half of the income distribution decreased by 1.3 percentage points, while the income share of the top 10 per cent increased by 1.7 percentage points. The HILDA Survey, by contrast, shows no net change in the Gini coefficient, a decrease in the 90-50 percentile ratio, and a slight (0.6 percentage point) increase in the income share of those in the bottom half of the income distribution. The HILDA Survey does show an increase in the 50-10 percentile ratio, and a rise in income poverty, but the increases are smaller in magnitude than the increases for the SIH annual series. Significantly, the SIH annual series shows the 99th percentile increasing by $46,753, compared with 34,157 in the HILDA series—hence, the 99th percentile in the SIH annual series goes from substantially below the 99th percentile in the HILDA series in 2001-02, to somewhat above it in 2008-09. The same pattern is

evident for the 95th percentile, although the magnitudes of the changes are more similar for the HILDA and annual SIH series, with the 95th percentile increasing by $16,225 in the HILDA series and $19, 896 in the annual SIH series.

Table 6: Comparisons of SIH and HILDA income distribution statistics—Income shares and poverty rates

	Income shares (%) by location in the distribution					Income poverty rate (%)
	Bottom 50%	51-90%	91-95%	96-99%	Top 1%	
HILDA Survey						
2000-01	28.7	48.3	9.3	9.4	4.4	12.8
2001-02	28.9	47.9	9.2	9.5	4.5	12.1
2002-03	29.0	48.0	9.1	9.4	4.5	12.8
2003-04	29.4	47.9	9.1	9.4	4.2	12.4
2004-05	29.3	47.7	9.1	9.5	4.4	11.7
2005-06	29.3	47.3	9.4	9.5	4.6	11.6
2006-07	28.5	46.9	9.2	9.9	5.6	13.1
2007-08	28.9	47.6	9.2	9.8	4.5	13.6
2008-09	29.6	47.7	8.9	9.2	4.6	13.4
2009-10	28.8	47.7	8.9	9.8	4.8	12.1
HILDA Survey difference from SIH						
SIH annual income						
2001-02	0.6	-0.9	0.0	0.1	0.1	-0.7
2002-03	0.5	-0.2	-0.2	-0.1	0.0	0.7
2004-05	1.3	0.1	-0.1	-0.6	-0.6	-1.6
2006-07	2.3	-1.0	-0.5	-0.9	0.2	-1.9
2008-09	2.5	-0.7	-0.5	-0.9	-0.4	-1.2
SIH weekly income - Annualised						
2000-01	0.3	-0.1	-0.1	-0.2	0.1	2.0
2002-03	0.4	-0.4	-0.1	0.2	0.0	1.3
2003-04	-0.4	0.1	0.1	0.1	0.1	2.6
2005-06	0.2	-0.2	0.3	-0.3	-0.1	0.3
2007-08	0.6	0.8	0.0	-0.6	-0.8	0.9
2009-10	0.2	0.2	-0.2	0.1	-0.2	1.2
Changes 2001-02 to 2008-09						
HILDA	0.6*	-0.2	-0.3	-0.2	0.1	1.3*
SIH annual income	-1.3*	-0.3	0.3*	0.8*	0.6*	1.8*
Changes 2000-01 to 2009-10						
HILDA	0.1	-0.6*	-0.3*	0.4*	0.3	-0.7
SIH weekly income	0.2	-0.9*	-0.1	0.2	0.6*	0.1

Notes: Income variable is household equivalised disposable income. * indicates the estimated change is significantly different from zero at the 5 per cent level, based on 1,000 bootstrap samples.

6. Comparisons with tax records data

A literature has recently emerged internationally which draws on tax record data, often in conjunction with national accounts data, to examine long-run trends in top incomes (see, for example, Atkinson, Picketty and Saez, 2011). Atkinson and Leigh (2007) present just such an analysis for Australia for the period 1920 to 2004, with Leigh since updating the series annually and placing the estimates on the Paris School of Economics website (<http://g-mond.parisschoolofeconomics.eu/topincomes/>). Burkhauser et al. (2013) revisit the Atkinson and Leigh series, and produce a series that excludes capital gains and applies a consistent treatment of dividend income. This series is particularly useful for the purposes of comparisons with household survey income data, which do not contain information on capital gains.

Here, I present a comparison of top income shares based on the SIH and HILDA income data with the tax-based top income shares produced by Burkhauser et al. (2013). To do this, I attempt to create comparable income variables, populations and units of analysis from the survey based data. To replicate the income variable available in the tax records data, personal income 'declarable' to the tax office is calculated for each individual in the sample aged 15 years and over. This is equal to personal gross income as per the income concept adopted by the surveys, but with the subtraction of family benefits (primarily Family Tax Benefit and the Baby Bonus), Disability Support Pension payments, Carer Allowance payments, scholarships and inter-household transfers received. Importantly, the income variable is *personal* income as opposed to equivalised *household* income. As with the analysis of household income presented in Sections 2, 4 and 5, the unit of analysis is the individual, but we now restrict to individuals aged 15 years and over. The SIH income concept is the 'pre-2007-08' basis.

To calculate income shares using tax records data, Burkhauser et al. (2013), in common with Atkinson and Leigh (2007), obtain the denominator (total income) from National Accounts data.[10] The survey-based estimates of top income shares are presented calculated in two ways. The first expresses income of the top income group as a percentage of total income as measured or captured by the survey itself. The second approach follows the tax records approach and expresses income of the top income group as a percentage of the National Accounts estimate of total income.

The tax records data is useful for providing a further independent source of data on income distribution trends, but it has important limitations, and certainly should not be viewed as necessarily providing the 'correct' picture of income distribution trends. First, tax data are collected for administrative purposes, and as such are susceptible to changes in tax law and administration which can affect the share and composition of income appearing in tax records. Perhaps more importantly, trends in the distribution of

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[10] Total income comes from *The Australian System of National Accounts 2011-12: Table 36. Household Income Account, Current Prices* (Catalogue No. 5204.0) (ABS 2012). It is equal to the sum of gross mixed income, compensation of employees, interest, dividends, workers' compensation, and social assistance benefits, minus interest payable by unincorporated enterprises and household sector consumption of fixed capital.

personal income declared to the tax office among individuals aged 15 years and over are potentially quite different to trends in the distribution of household equivalised disposable income among all individuals.

Table 7 presents estimates of the income shares of the 91st to 95 percentiles, 96th to 99th percentiles and top 1 per cent of the distribution of personal 'declarable' income among individuals aged 15 years and over. Estimates are presented for all SIH surveys conducted between 1994-95 and 2009-10, and all waves the HILDA Survey conducted up to 2011, alongside Burkhauser et al.'s (2013) estimates based on tax records for the same years. The columns headed 'Survey income total' use total personal 'declarable' income measured by the survey itself as the denominator in calculating top income shares, while the columns headed 'National Accounts income total' use the same National Accounts estimate of total household income that is used to produce the tax-records-based estimates of top income shares.

For all three survey-based series, top income shares estimates are lower when using the National Accounts estimate of total income, at least in part because personal declarable income, by construction, excludes some sources of household income, such as non-taxable transfer payments. Under-reporting of income by survey respondents may also contribute to the lower values. However, even when using the National Accounts measure of total income, the income shares of the top income groups are, in all three survey-based series, similar to the tax-based income shares. Indeed, the survey-based income shares are frequently slightly higher than the tax-based shares, which perhaps reflects imperfect capture of 'declarable' income by taxation records.[11]

Table 7 also presents comparisons of changes in top income shares, and identifies the changes in the survey-based estimates that are statistically significant. There are differences between the three survey-based series and the tax-records-based series, although the differences dependent on the particular time-frame examined. Nonetheless, the point estimates of the growth in the income share of the top one per cent and the 96th to 99th percentiles over the 2000s is higher in the two SIH series than in the tax-records series. The HILDA Survey shows no statistically significant changes in income shares of top income groups, although the point estimates indicate similar net changes over the 2000-01 to 2010-11 to those evident in the taxed-based data. A notable feature of the weekly SIH top income shares is that their growth is greater when using National Accounts data to obtain total income. This suggests that the proportion of weekly income captured by the SIH has increased over the 2000s, which is consistent with the changes in ABS methods producing improved income estimates.

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[11] For example, data based on tax records excludes some individuals who are late in lodging tax returns.

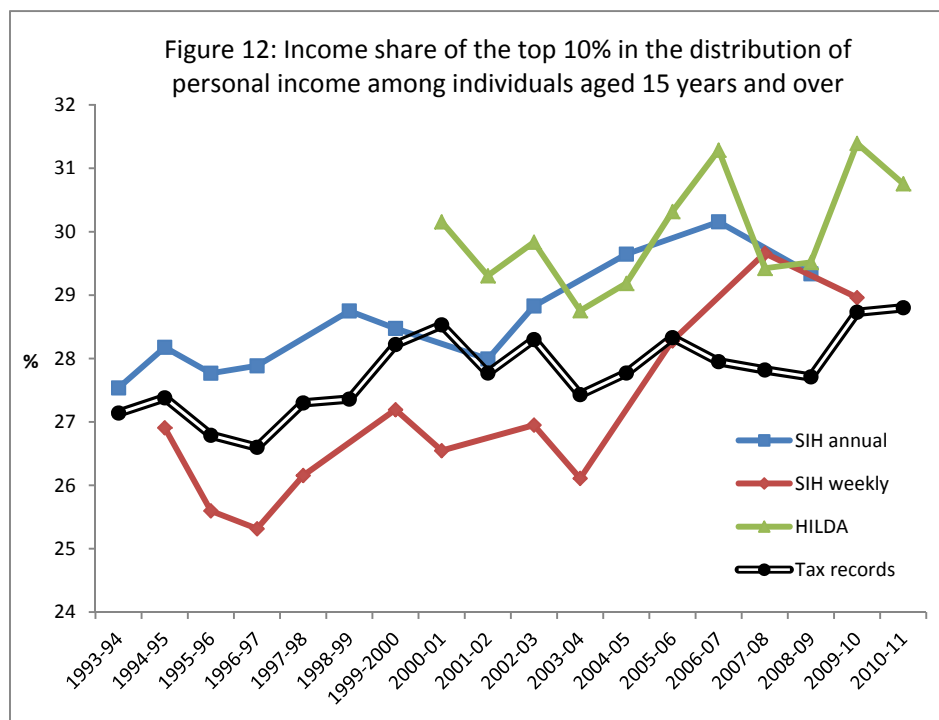Table 7: Top income shares—Personal 'declarable' gross income of individuals aged 15 years and over (%)

	Survey income total			National Accounts income total			Tax data		
	91st-95th percentiles	96th-99th percentiles	Top percentile	91st-95th percentiles	96th-99th percentiles	Top percentile	91st-95th percentiles	96th-99th percentiles	Top percentile
SIH annual income									
1993-94	12.2	13.0	7.1	10.4	11.1	6.0	10.1	10.9	6.1
1994-95	12.2	13.4	7.4	10.4	11.4	6.3	10.1	11.0	6.3
1995-96	12.1	13.4	7.5	10.2	11.3	6.3	9.9	10.8	6.1
1996-97	12.0	13.5	8.1	10.0	11.2	6.7	9.8	10.7	6.1
1998-99	12.1	14.0	7.7	10.3	11.9	6.6	9.8	11.0	6.5
1999-2000	12.0	13.7	8.1	10.1	11.5	6.8	9.9	11.2	7.2
2001-02	12.1	13.7	7.6	10.2	11.5	6.3	9.7	11.0	7.1
2002-03	12.2	13.9	8.0	10.3	11.8	6.7	9.8	11.2	7.4
2004-05	12.1	14.2	9.2	10.1	11.9	7.7	9.5	10.8	7.5
2006-07	12.3	14.9	9.3	10.2	12.3	7.7	9.3	10.9	7.7
2008-09	12.4	14.6	8.6	10.2	12.0	7.1	9.3	10.9	7.5
Changes									
1993-94 to 2001-02	-0.1	0.6*	0.5	-0.3	0.4	0.3	-0.5	0.1	1.0
2001-02 to 2008-09	0.3	0.9*	1.1	0.0	0.5*	0.8	-0.4	-0.1	0.5
SIH weekly income									
1994-95	11.9	13.4	7.7	9.8	10.9	6.3	10.1	11.0	6.3
1995-96	12.0	13.4	7.4	9.3	10.5	5.7	9.9	10.8	6.1
1996-97	11.9	13.7	6.7	9.4	10.7	5.2	9.8	10.7	6.1
1997-98	12.1	13.5	7.7	9.5	10.6	6.0	9.9	11.0	6.4
1999-2000	12.2	14.1	8.0	9.7	11.1	6.3	9.9	11.2	7.2
2000-01	11.8	13.5	8.3	9.3	10.7	6.5	9.8	11.2	7.5
2002-03	12.0	13.6	7.7	9.8	11.0	6.2	9.8	11.2	7.4
2003-04	11.9	13.6	7.6	9.4	10.7	6.0	9.4	10.8	7.3
2005-06	12.0	14.0	8.2	9.9	11.6	6.8	9.6	11.1	7.6
2007-08	11.9	14.4	9.2	9.9	12.0	7.7	9.3	10.8	7.7
2009-10	12.2	14.3	8.4	10.1	11.8	7.0	9.6	11.3	7.8
Changes									
1994-95 to 2000-01	-0.1	0.2	0.6	-0.4	-0.2	0.3	-0.3	0.3	1.2
2000-01 to 2009-10	0.4*	0.7*	0.1	0.8*	1.2*	0.5	-0.2	0.1	0.3
HILDA Survey									
2000-01	12.2	14.0	8.1	10.7	12.3	7.1	9.8	11.2	7.5
2001-02	11.6	13.9	8.3	10.1	12.1	7.2	9.7	11.0	7.1
2002-03	12.2	13.7	8.2	10.7	12.0	7.2	9.8	11.2	7.4
2003-04	12.2	14.0	8.0	10.3	11.8	6.7	9.4	10.8	7.3
2004-05	12.0	13.9	8.3	10.3	11.9	7.0	9.5	10.8	7.5
2005-06	12.2	13.6	8.1	10.9	12.1	7.3	9.6	11.1	7.6
2006-07	11.7	13.8	9.7	10.4	12.2	8.6	9.3	10.9	7.7
2007-08	11.9	14.1	7.9	10.3	12.3	6.9	9.3	10.8	7.7
2008-09	11.8	14.1	8.4	10.1	12.2	7.2	9.3	10.9	7.5
2009-10	12.0	14.0	8.7	10.8	12.7	7.9	9.6	11.3	7.8
2010-11	12.3	14.5	8.6	10.7	12.6	7.5	9.6	11.4	7.9
Changes									
2001-02 to 2008-09	0.2	0.2	0.1	0.1	0.1	0.0	-0.4	-0.1	0.5
2000-01 to 2009-10	-0.2	0.1	0.7	0.1	0.4	0.8	-0.2	0.1	0.3
2000-01 to 2010-11	0.1	0.5	0.5	-0.1	0.3	0.4	-0.3	0.2	0.4

Note: * indicates the estimated change is significantly different from zero at the 5 per cent level, based on 1,000 bootstrap samples (applicable only to survey-based estimates).

Figure 12 summarises Table 7 by presenting the total income share of the top 10 per cent applying the same control total for income to all series. The share of the top 10 per cent is simply equal to the sum of the three income shares presented in the table. The tax data show the income share of the top 10 per cent declining slightly over the 2000s to 2008-09, rising by one percentage point in 2009-10 and remaining essentially unchanged in 2010-11. The SIH annual series shows a rise in the 2000s up to 2006-07 of

approximately 2.2 percentage points, subsequent to which there was a decline to 2008-09 of 0.9 percentage points. The SIH weekly series shows a very large rise between 2003-04 and 2007-08 of 3.6 percentage points and then a 0.7 percentage point decline in 2009-10. The HILDA series is perhaps closest in trend over time (but not level) to the tax data, with the exception that the increase between 2005-06 and 2006-07 is not evident in the tax data. Abstracting from the 2006-07 spike, the slight net decline between 2000-01 and 2008-09 evident in the tax data is mirrored by the HILDA series, as is the rise between 2008-09 and 2009-10.

Clearly, the tax data do not show the sharp rise in the income share of the top 10 per cent that is evident in the two SIH series over the early-to-mid 2000s. This therefore provides support for the contention that the rise in measured inequality in the SIH series over this period is, to at least some extent, an artefact of methodological changes made by the ABS. This is despite, in the annual series, a notionally consistent (pre-2007-08) income concept being adopted.

Figure 12: Income share of the top 10% in the distribution of personal income among individuals aged 15 years and over

Note: Income total is derived from National Accounts data as per Burkhauser et al. (2013).

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## 7. Comparisons with National Accounts aggregates

The measure of total household income available from the National Accounts used to produce top income shares can also be used to directly examine the extent to which the household surveys 'capture' all household income. That is, estimated total household gross income as measured by the SIH and the HILDA Survey can be compared with the household income total derived from the National Accounts. On the assumption that the National Accounts provide an accurate measure of total household income, the closer the survey-based total to the National Accounts total, the better is the survey's income capture. Comparisons of income aggregates provide no information about the distribution of income among the population, but it is nonetheless informative to ascertain whether the share of total household income measured by the SIH and by the HILDA Survey has changed over the decade. For example, a finding that the share of income captured by the SIH rose in the mid-2000s would be indicative of improved income measurement. While this need not have implications for measured inequality, it is highly unlikely that improved income capture would be distributionally neutral.

Figure 13 presents, for each survey income series, total household gross income as a proportion of household income as measured in the National Accounts.[12] For the SIH, in addition to the 'relatively consistent' income series, estimates are also presented for the final two SIH survey years adopting the 2007-08 income concept. The figure shows no trend change in the share of income captured by the HILDA Survey, although the share is generally more volatile from year to year than is the case for the SIH series. Quite different trends are evident for the SIH weekly and annual income series. There is a clear rise in income capture in the weekly series between 2003-04 and 2007-08, even when the pre-2007-08 income concept is used. The rise is even greater between 2005-06 and 2007-08 when switching from the pre-2007-08 income concept in 2005-06 to the 2007-08 income concept in 2007-08 and 2009-10. The annual SIH series, however, shows no such rise, irrespective of income concept; indeed, there is a decline in income capture between 2002-03 and 2006-07, from 88 per cent to 86 per cent.

There are therefore indications that the changes to ABS survey methods and income concept increased the extent of income capture in the SIH weekly series, but there does not appear to have been a corresponding increase in income capture for the SIH annual series. This provides evidence that improvements in income measurement could be a driver of measured inequality changes in the weekly SIH series. For the annual SIH series, income capture actually declined slightly over the decade, which is surprising given that many of the changes to survey methods might be expected to have similar impacts on weekly and annual income measurement. Of course, it is possible that the factors improving weekly income capture have also

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[12] Note that the income variable differs from that examined in Section 6, where only income 'declarable' to the tax office was included.

improved annual income capture, but have been offset by other factors negatively impacting on annual income capture.

Figure 13: Proportion of National Accounts measure of household income captured by SIH and HILDA
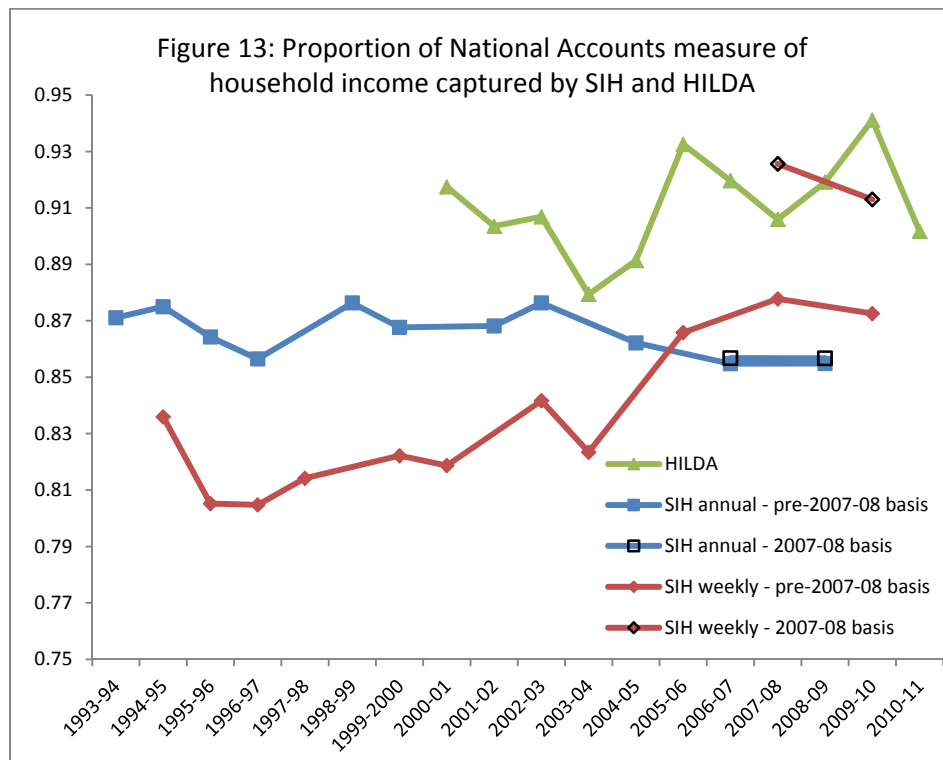
8. Exploring the sources of inequality trends

Examination of the constituent parts that go to producing the distribution of equivalised disposable income is useful for better understanding what has happened to the income distribution. Where all data series agree, we can have more confidence that the trends are real as opposed to some form of measurement error. Moreover, we can potentially isolate the drivers of divergence between the series. In this section, several approaches are employed using the SIH and HILDA Survey data to examine the sources of inequality trends, and therefore also the sources of differences in trends across the income series.

First, trends are examined when the income distributions are truncated to the middle 90 per cent of the distribution—that is, the bottom 5 per cent and top 5 per cent of the income distribution are excluded. This simply ascertains the extent to which trends, and differences in trends, are driven by the extremities of the income distribution, where measurement error is more likely to be present. Second, changes in the effects of equivalisation—that is, changes in the effects of adjusting income for household composition—are examined by comparing changes in income distributions before and after equivalisation. This identifies the effects of changes in household size and how households of different sizes are distributed across the unequivalised income distribution. For example, if the average size of households towards the upper end of the income distribution became smaller and the average size of households towards the lower end of the

income distribution became larger, equivalisation would act to decrease income inequality less at the end of the decade than at the start.

Third, the effects of changes in income taxes, government benefits (transfers), wage and salary income, and non-wage market income are examined by comparing changes in the income distribution with and without each respective income component. Decompositions of inequality measures by factor source—wages, transfers, other income and income taxes—are also conducted, which have the attraction of identifying the relative contribution of each factor to the total change in the inequality measure (but are limited to summary measures of overall inequality and are less transparent in how each component contributes to the overall income distribution). Finally, the distributions of three income components are themselves examined: government benefits, wages and non-wage market income.

8.1 Inequality excluding the tails of the income distribution

Figure 14 and Table 8 compare distributional features for disposable income when the tails of the income distribution—the bottom 5 per cent and top 5 per cent of incomes—are excluded. This identifies whether differences in trends are driven by differences in changes in extremely low or high incomes. It is clear that, while changes are smaller, divergences between the three series are of the same nature. It therefore does not appear to be simply due to extreme values. The annual series still shows a sharp upward spike in the Gini coefficient between 2004-05 and 2006-07, contrasting with the much milder increases evident for the weekly series and HILDA, which broadly speaking track each other quite closely.

Figure 14: Gini coefficient for household equivalised disposable income - Excluding the bottom 5% and top 5% of the distribution
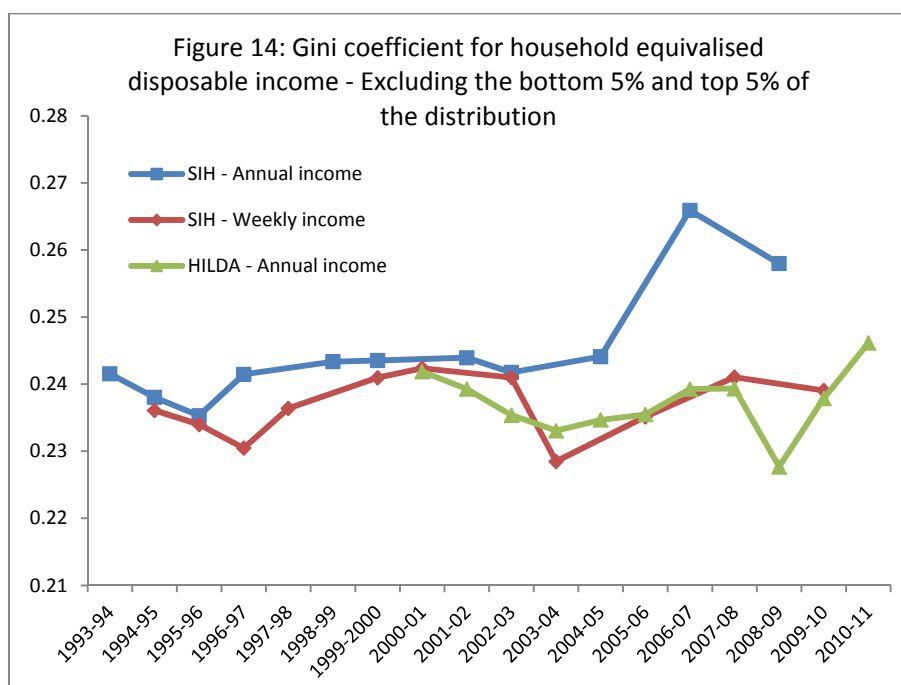
The estimates presented in Table 8 confirm these patterns and show all measures of inequality increased significantly for the annual SIH series, but not the weekly SIH or HILDA series. However, at odds with the analysis that included the tails of the distribution, the HILDA Survey shows a significant decrease in the 50-

10 percentile ratio over the 2000s (2000-01 to 2009-10) which is not in evidence for the SIH weekly series (although the weekly SIH estimate of the change is in fact negative).

Table 8: SIH and HILDA compared—Excluding the bottom 5% and top 5% of the income distribution

	Mean ($)	Median ($)	Gini coefficient	90-50 percentile ratio	50-10 percentile ratio
SIH annual income					
2001-02	31,892	29,828	0.244	1.750	1.950
2002-03	32,084	30,071	0.242	1.733	1.923
2004-05	34,142	32,252	0.244	1.722	1.966
2006-07	36,857	33,730	0.266	1.841	2.040
2008-09	39,417	36,768	0.258	1.792	2.029
SIH weekly income – Annualised					
2000-01	30,627	28,605	0.242	1.756	1.882
2002-03	31,380	29,118	0.241	1.768	1.884
2003-04	32,992	31,161	0.228	1.688	1.854
2005-06	36,183	33,719	0.235	1.721	1.875
2007-08	40,233	37,600	0.241	1.749	1.919
2009-10	40,048	36,919	0.239	1.773	1.866
HILDA Survey					
2000-01	33,781	31,298	0.242	1.771	1.948
2001-02	33,685	31,479	0.239	1.735	1.926
2002-03	33,960	32,025	0.235	1.702	1.943
2003-04	34,976	33,269	0.233	1.689	1.926
2004-05	36,386	34,039	0.235	1.728	1.907
2005-06	38,200	35,610	0.235	1.707	1.870
2006-07	40,009	37,452	0.239	1.740	1.950
2007-08	41,408	38,749	0.239	1.736	1.975
2008-09	43,360	41,358	0.228	1.670	1.955
2009-10	42,890	39,929	0.238	1.753	1.909
Changes 2001-02 to 2008-09					
HILDA	9,675*	9,879*	-0.012*	-0.065*	0.029
SIH annual income	7,525*	6,940*	0.014*	0.042*	0.078*
Changes 2000-01 to 2009-10					
HILDA	9,109*	8,631*	-0.004*	-0.018	-0.038*
SIH weekly income	9,420*	8,314*	-0.003*	0.017	-0.016

Notes: Income variable is household equivalised disposable income at December 2010 prices. * indicates the estimated change is significantly different from zero at the 5 per cent level, based on 1,000 bootstrap samples.

8.2 Changes in the effects of equivalisation

Figure 15 presents the effects of adjusting household income for household composition using the OECD equivalence scale on the Gini coefficient for each of the three income series. Each data point is equal to the Gini coefficient for household equivalised disposable income of individuals minus the Gini coefficient for unequivalised household income of individuals. The figure shows that the effects of equivalisation have changed little over the 2000s, acting to decrease the Gini coefficient by between 0.02 and 0.04. All three series show a decline in the effect over the early-to-mid 2000s, followed by a slight increase, with little net change over the decade.

Table 9 uses the same approach as used to produce Figure 15 to examine the effects of equivalisation on a wider range of inequality measures, with the upper panel presenting the effect of equivalisation on each measure at the start of the decade and the lower panel presenting the change in effect over the decade.

For the change in effect, a positive number for the Gini coefficient and the percentile ratios means that equivalisation reduced inequality less in the end year than in the base year; while a positive number for the income shares means that equivalisation increased the income share by more (or decreased the income share by less) in the end year than in the base year. For example, the estimate of -0.002 in the lower left cell indicates that equivalisation reduced the Gini coefficient in HILDA by 0.002 more in 2009-10 than it did in 2000-01.
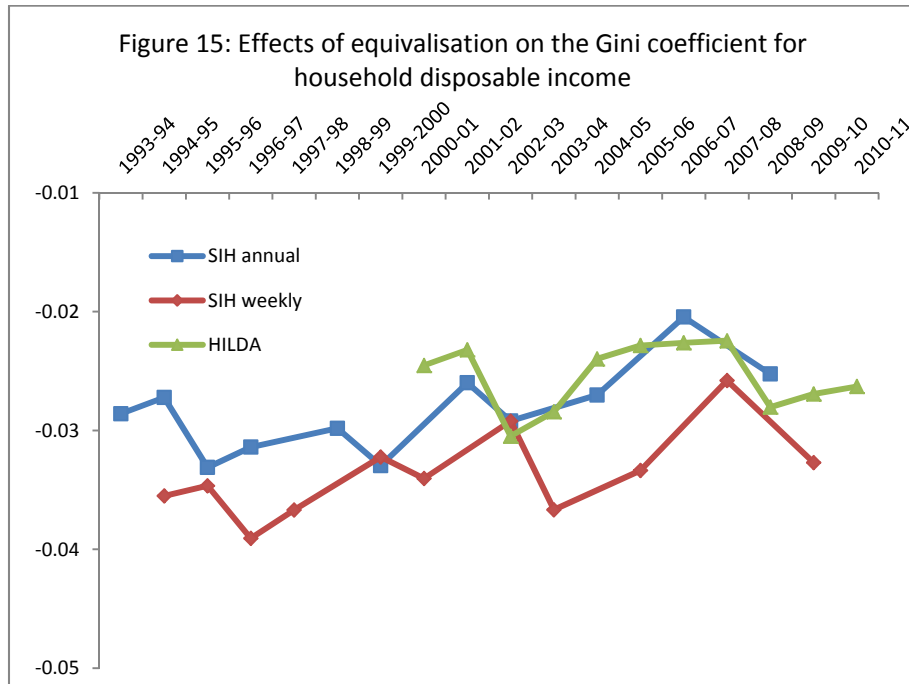

Figure 15: Effects of equivalisation on the Gini coefficient for household disposable income

Table 9: Effects of equivalisation on the distribution of household disposable income

	Gini coefficient	Percentile ratios		Income shares (%) by location in the distribution				
		90-50	50-10	Bottom 50%	51-90%	91-95%	96-99%	Top 1%
Effect of equivalisation in base year								
2001-02								
SIH annual income	-0.026	-0.086	-0.633	1.9	-1.3	-0.4	-0.2	0.0
HILDA	-0.023	0.033	-0.586	1.8	-1.3	0.0	-0.3	-0.1
2000-01								
SIH weekly income	-0.034	-0.041	-0.598	2.2	-0.9	-0.3	-0.9	-0.3
HILDA	-0.025	0.002	-0.620	1.8	-1.2	-0.3	-0.4	0.1
Change in effect (Effect in end year minus effect in base year)								
2001-02 to 2008-09								
SIH annual income	0.001	0.017	-0.145	0.0	0.2	0.0	-0.2	-0.1
HILDA	-0.005	-0.049	0.003	0.4	-0.1	-0.3	-0.2	0.2
2000-01 to 2009-10								
SIH weekly income	0.001	-0.021	-0.019	0.1	-0.3	-0.1	0.4	-0.1
HILDA	-0.002	-0.054	0.002	0.2	0.2	-0.3	0.1	-0.2

Both of the SIH series show equivalisation acted to decrease the 50-10 percentile ratio by more in the end year than in the base year, whereas the HILDA Survey shows almost no change in the effects of equivalisation on the 50-10 ratio. For the 90-50 ratio, the HILDA Survey shows equivalisation was reducing the ratio to a greater extent in the end year. This is, to a lesser extent, evident in the weekly SIH series, but

not at all evident in the annual SIH series, which shows equivalisation reducing the 90-50 ratio by less in the end year. Consistent with these patterns, the HILDA Survey shows equivalisation increased the income share of the bottom 50 per cent of the distribution by more in the end year, to a lesser extent evident in the weekly SIH series and not at all in evidence in the annual SIH series. Equivalisation decreases the income share of the top 10 per cent, and did so to a slightly great extent at the end of the decade than at the beginning for both the HILDA and annual SIH series. For the weekly SIH series, however, the reduction in the income share of the top 10 per cent due to equivalisation was slightly lower at the end of the decade than at the start of the decade. Thus, changes in the distribution of household sizes across the income distribution do not appear to explain any of the relative growth in top incomes (compared with the HILDA Survey) in the annual SIH series, but can explain some of the relative growth in top incomes in the weekly SIH series.

8.3 Contributions of components of income to inequality trends

The household income variables available in the SIH and the HILDA Survey are obtained by aggregating across a number of income components, each of which is separately available in the unit record files. It is therefore possible to examine the contribution that each component makes to income inequality levels and trends, and thereby identify the components responsible for divergence in levels and trends.

In this section, household equivalised disposable income is disaggregated into four distinct components: income taxes; government cash benefits; wage and salary income; and other income, which primarily comprises investment and business income. The contribution of each component is then examined by comparing inequality measures for household income with and without the income component. Specifically, to examine the effects of income taxes, the distribution of household equivalised disposable income is compared with the distribution of household equivalised gross income. To examine the effects of each of the other three components, the approach is to examine the marginal effect of the income component on the distribution of household equivalised gross income, whereby the distribution of household equivalised gross income is compared with the distribution of equivalised gross income *excluding the component*. That is, distributional statistics are calculated for gross equivalised income with the component included, and then calculated for gross equivalised income excluding the component; the difference is the 'effect' of the component on the distribution of equivalised gross income. Gross income is examined here rather than disposable income to avoid negative incomes that will often result when a component is removed (given it is not possible to calculate an after-tax value for each income component).

Note that these marginal effects are interpreted as 'the effect of the component, taking as given the existing distribution of the other components'. Consequently, the marginal effects do not add up to the total effect. That is, the total level of an inequality measure cannot be calculated as the sum of the marginal effects; and the total change in an inequality measure will likewise not equal the sum of the marginal

effects of the components on the change in the measure. (Indeed, as we will see, the estimated marginal effects on inequality are negative for all components.) For this analysis, to ensure that the components sum to household equivalised disposable income, which is constrained to be non-negative, negative equivalised non-wage market income is constrained to be no more than the sum of equivalised wage and benefit income.

Ex ante, it might be expected that differences in trends will be most evident in relation to non-wage non-benefit income, since the changes to ABS methods most directly affect business and investment income. However, some changes, such as the collection of salary sacrifice income, will potentially affect wage and salary income, and general changes such as the implementation of computer-assisted interviewing could impact on all income components. Moreover, potential 'spillover' effects of changes to methods cannot be ruled out.

Income taxes

Figure 16 and Table 10 present estimates of the marginal effect of income taxes on the distribution of income. They are interpreted in the same way as Figure 15 and Table 9, but show the difference between the distribution of equivalised gross income and the distribution of equivalised disposable income. In Table 10, each reported statistic in the lower panel is the estimated effect of income taxes on the measure in the end year minus the estimated effect on the measure in the base year. The figure and table both show similar effects of income taxes on the level inequality for all three income series. There is also clear evidence that the effects of income taxes in reducing inequality have declined over the decade to 2010, most vividly illustrated by Figure 16, which shows a similar decline in the impact of taxes on the Gini coefficient for all three income series, acting to decrease it by approximately 0.050 at the start of the decade and by approximately 0.045 at the end of the decade. This reflects the reductions in income tax rates, and increases in the income thresholds at which higher rates take effect, that occurred over the period. Tax changes occurred in 2000-01 and in each year from 2003-04 to 2009-10, with the biggest changes occurring in 2006-07. A change in 2007-08 that rendered all superannuation lump sum payouts in retirement non-taxable could also in principle have contributed to the decline in the redistributive effect of income taxes, although in practice self-funded retired people paid little income tax prior to the change.
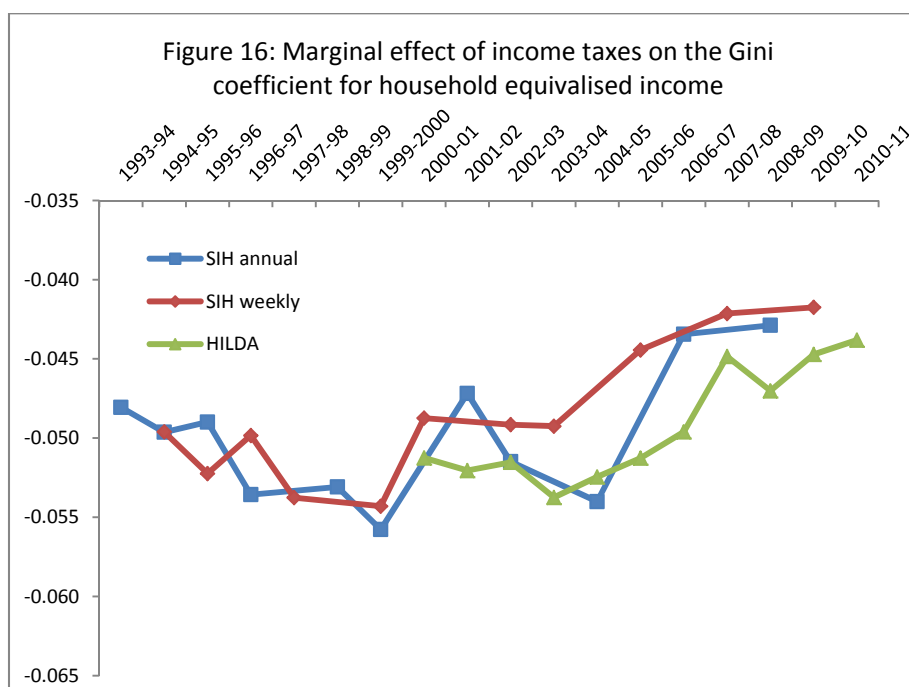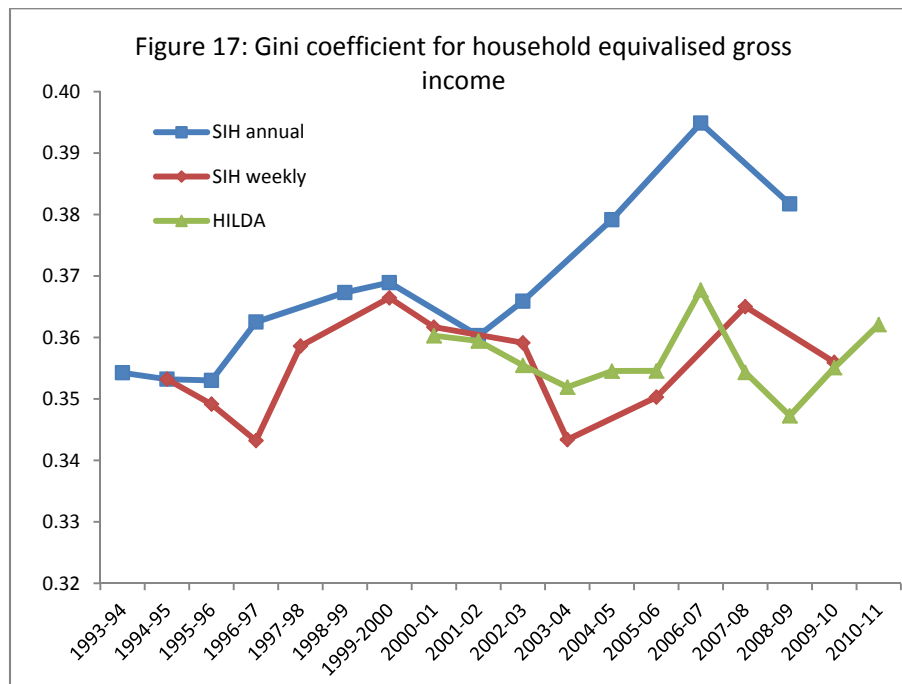
Figure 16: Marginal effect of income taxes on the Gini coefficient for household equivalised income

Table 10: Marginal effect of income taxes on the distribution of household equivalised income

	Mean (%)	Gini coefficient	Percentile ratios		Income shares (%) by location in the distribution				
			90-50	50-10	Bottom 50%	51-90%	91-95%	96-99%	Top 1%
Effect of income taxes in base year									
2001-02									
SIH annual income	-20.6	-0.047	-0.205	-0.360	3.1	-0.2	-0.6	-1.2	-1.1
HILDA	-18.9	-0.052	-0.230	-0.330	3.4	-0.2	-0.7	-1.7	-0.9
2000-01									
SIH weekly income	-18.8	-0.050	-0.190	-0.342	3.2	-0.1	-0.5	-1.5	-1.0
HILDA	-18.9	-0.051	-0.232	-0.354	3.4	-0.2	-0.7	-1.5	-1.0
Change in effect (Effect in end year minus effect in base year)									
2001-02 to 2008-09									
SIH annual income	4.4	0.004	-0.007	0.056	-0.3	0.1	-0.1	0.1	0.1
HILDA	2.7	0.005	0.040	0.030	-0.3	0.1	0.1	0.3	-0.2
2000-01 to 2009-10									
SIH weekly income	2.4	0.007	-0.008	0.035	-0.4	-0.1	-0.2	0.5	0.3
HILDA	2.9	0.007	0.036	0.087	-0.4	0.2	-0.1	-0.2	0.5

Note: Change in effect on the mean is expressed in percentage points.

It is unsurprising that the differences in inequality trends between the three series are not attributable to differences in the effects of income taxes. Figure 17 shows the Gini coefficient for gross (pre-income tax) equivalised income, which is the income variable for which marginal effects of benefits, wages and other income are estimated. It illustrates that, for the weekly SIH and HILDA series, inequality in pre-tax income actually declined between 2000-01 and 2009-10; in stark contrast, the annual SIH series exhibits a sharp increase in the Gini coefficient between 2001-02 and 2006-07 that is only partially offset by a decline between 2006-07 and 2008-09.

Figure 17: Gini coefficient for household equivalised gross income

Effects of government cash benefits

Figure 18 and Table 11 examine the marginal effect of government benefits on the distribution of household equivalised gross income. Similar to Figure 17 and Table 10 for income taxes, they show the difference between the distribution of equivalised gross income excluding government benefits and the distribution of equivalised gross income including government benefits. In Table 11, as before, a positive value for the estimated 'change in effect' implies transfers were reducing the measure by less (or increasing the measure by more) in the end year than in the base year.

Focusing on the Gini coefficient, over the 2000s as a whole, the impact of government benefits in reducing inequality is smallest in the annual SIH series and largest in the weekly SIH series. However, all three income series showing a declining inequality-reducing impact up to 2007, and an increase in impact following the GFC in 2008. The HILDA Survey, which contains the most recent data, suggests the post-GFC increase was a temporary deviation from trend. Changes in reliance on income support are likely to be the main driver of these trends, in turn a reflection of changes in employment levels. However, expansion in family payments, primarily through increases in Family Tax Benefit and the introduction of the Baby Bonus, may also be a factor, since these payments are not as targeted on low-income households as are income support payments.[13] Table 11 shows that, while there are some differences across the income series in the magnitude of changes in the effects of government benefits, in general the three series tell very similar stories.

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[13] Family Tax Benefit was introduced in 2000-01, and there were significant real increases in 2004-05 and 2006-07. The Baby Bonus (initially called Maternity Payment) was introduced in 2004-05, paying $3,000 per child born or adopted. It was increased to $4,000 in 2006-07 and to $5,000 in 2008-09.
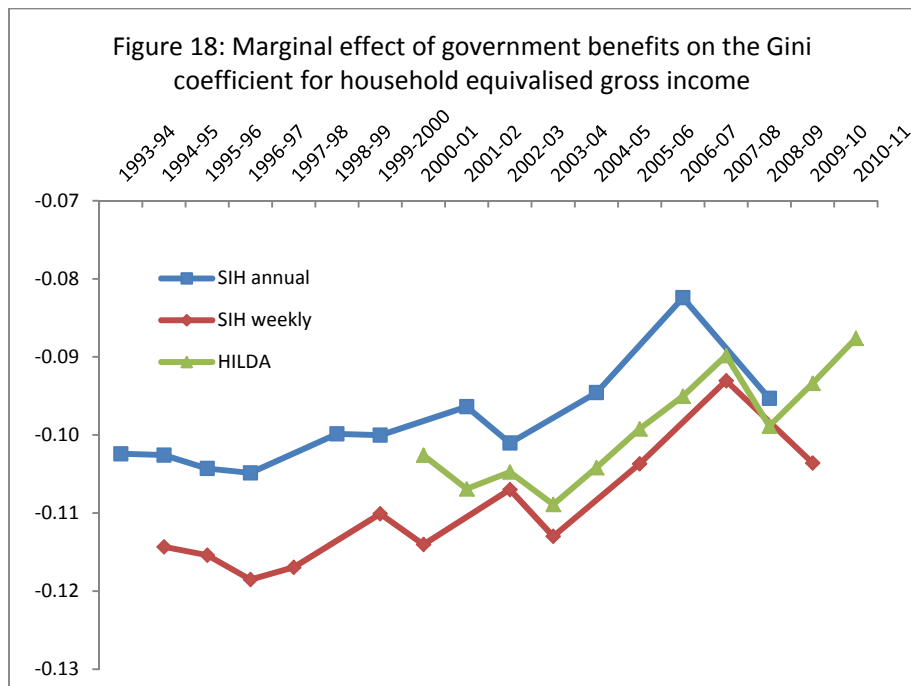
Figure 18: Marginal effect of government benefits on the Gini coefficient for household equivalised gross income

Table 11: Marginal effect of government benefits on the distribution of household equivalised gross income

	% > 0	Mean (%)	Gini coefficient	90-50 percentile ratio	Income shares (%) by location in the distribution				
					Bottom 50%	51-90%	91-95%	96-99%	Top 1%
Effect of government benefits in base year									
2001-02									
SIH annual income	7.7	11.4	-0.096	-0.138	7.1	-4.2	-1.1	-1.2	-0.6
HILDA	6.5	13.5	-0.107	-0.189	7.8	-4.4	-1.3	-1.4	-0.7
2000-01									
SIH weekly income	9.9	13.6	-0.114	-0.164	8.3	-4.9	-1.3	-1.5	-0.6
HILDA	6.7	12.8	-0.103	-0.180	7.5	-4.3	-1.1	-1.5	-0.6
Change in effect (Effect in end year minus effect in base year)									
2001-02 to 2008-09									
SIH annual income	-2.9	1.0	0.001	-0.039	0.0	0.4	-0.1	-0.1	-0.1
HILDA	-1.1	0.2	0.007	-0.072	-0.6	0.4	0.1	0.1	-0.1
2000-01 to 2009-10									
SIH weekly income	-3.9	-1.6	0.013	-0.005	-0.8	0.5	0.2	0.2	-0.1
HILDA	-2.1	-1.6	0.009	0.020	-0.7	0.4	0.1	0.2	0.0

Note: Change in effect on the mean is expressed in percentage points.

Effects of wage and salary income

Figure 19 and Table 12 indicate that wage and salary income is a key source of divergence in inequality trends between the three income series. The weekly SIH series shows little net change in the impact of wage and salary income on the Gini coefficient, the annual SIH series shows a declining effect (that is, the extent to which wage and salary income decreases the Gini coefficient has decreased, the corollary of which is that changes in the equivalised wage distribution have acted to increase equivalised income inequality), while the HILDA Survey shows growth in the negative impact of wage and salary income on the Gini coefficient (that is, changes in the distribution of wage and salary income have acted to decrease income inequality).
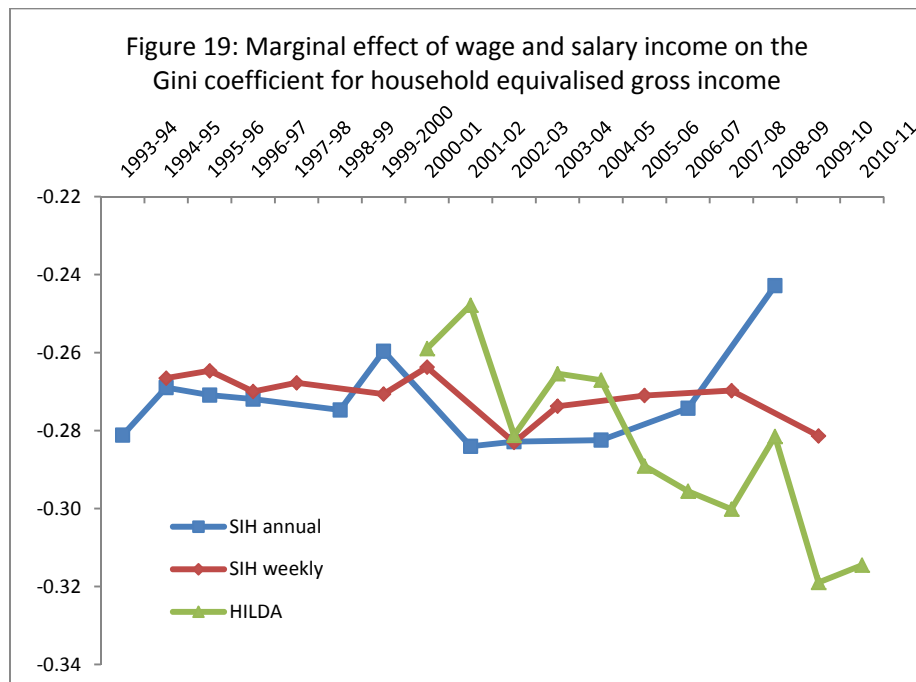
Figure 19: Marginal effect of wage and salary income on the Gini coefficient for household equivalised gross income

Table 12: Marginal effect of wage and salary income on the distribution of household equivalised gross income

	% > 0	Mean (%)	Gini coefficient	90-50 percentile ratio	Income shares (%) by location in the distribution				
					Bottom 50%	50-90%	91-95%	96-99%	Top 1%
Effect of wages in base year									
2001-02									
SIH annual income	14.2	298.8	-0.284	-2.624	19.4	-1.1	-3.7	-7.5	-7.1
HILDA	9.1	275.4	-0.248	-1.161	16.6	-1.9	-3.0	-5.9	-5.8
2000-01									
SIH weekly income	14.4	262.1	-0.264	-1.636	18.3	-1.9	-2.5	-5.4	-8.5
HILDA	10.3	293.9	-0.259	-1.313	17.5	-2.8	-3.2	-6.1	-5.3
Change in effect (Effect in end year minus effect in base year)									
2001-02 to 2008-09									
SIH annual income	-8.2	-8.4	0.041	0.515	-3.9	3.3	1.5	0.6	-1.6
HILDA	-5.2	0.1	-0.034	-0.111	0.7	3.1	0.4	-0.4	-3.9
2000-01 to 2009-10									
SIH weekly income	0.3	3.8	-0.018	-0.290	0.5	1.5	-0.3	-1.4	-0.3
HILDA	1.4	11.4	-0.060	-0.411	2.6	3.6	0.1	-1.9	-4.4

Note: Change in effect on the mean is expressed in percentage points.

Table 12 further shows that changes in wage and salary income have acted to decrease the income share of the bottom half of the income distribution in the annual SIH series, but increase it in the HILDA and weekly SIH series. In both the HILDA and weekly SIH series, changes in the wage distribution acted to decrease the income share of the top 10 per cent. In the annual SIH series, while wage changes acted to decrease the income share of the top 1 per cent, this was more than offset by increases in the income share of the 91st to 99th percentiles. Correspondingly, wage changes acted to reduce the 90-50 percentile ratio for SIH annual income by 0.515 less in 2008-09 than in 2001-02, whereas wages changes acted to reduce the 90-50 ratio by more at the end of the decade than at the start of the decade in both the SIH weekly and HILDA series.

Effects of non-benefit non-wage income

Figure 20 and Table 13 show that the marginal effects of non-benefit non-wage income, or non-wage market income, are smaller in magnitude in the HILDA series than in the two SIH series, which show similar magnitudes in effects. All three series show that changes in non-wage market income have acted to increase income inequality over the decade to 2010. Over the decade as a whole, the inequality-increasing effects are greater in the annual SIH series than in the other two series, although Figure 20 indicates that, after 2003-04, non-wage market income acted to increase inequality to a similar extent in the two SIH series, with the net effect over the decade as a whole smaller in the weekly SIH series because of an inequality-reducing effect of changes in the income component between 2000-01 and 2003-04. Consequently, at least some of the divergence of the SIH series from the HILDA series appears to be attributable to differences in changes in the distribution of non-wage market income.
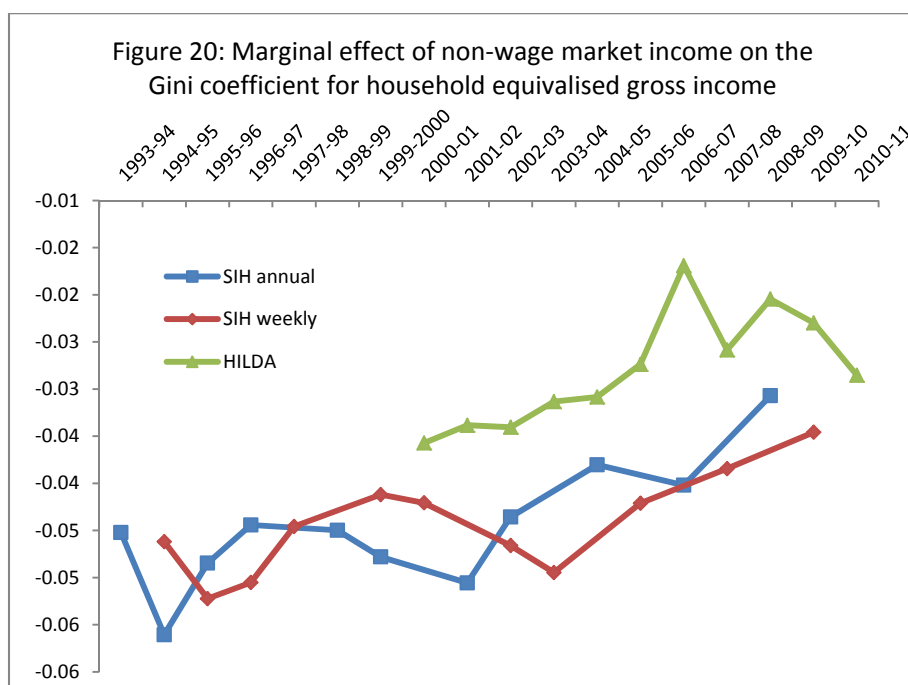

Figure 20: Marginal effect of non-wage market income on the Gini coefficient for household equivalised gross income

Table 13: Marginal effect of non-wage market income on the distribution of household equivalised gross income

	% > 0	Mean (%)	Gini coefficient	Percentile ratios		Income shares (%) by location in the distribution				
				90-50	50-10	Bottom 50%	51-90%	91-95%	96-99%	Top 1%
Effect of non-wage market income in base year										
2001-02										
SIH annual income	2.7	17.4	-0.051	-0.164	-1.712	3.9	-2.8	-0.8	-0.6	0.3
HILDA	1.8	17.4	-0.034	-0.055	-0.686	2.8	-2.3	-0.5	0.0	0.1
2000-01										
SIH weekly income	2.9	18.5	-0.042	-0.140	-1.388	3.5	-3.1	-0.7	-0.4	0.7
HILDA	2.0	16.4	-0.036	-0.057	-0.727	2.8	-2.1	-0.5	-0.3	0.1
Change in effect (Effect in end year minus effect in base year)										
2001-02 to 2008-09										
SIH annual income	-1.9	-0.9	0.020	0.045	0.087	-1.2	-0.1	0.3	0.4	0.5
HILDA	-1.5	-1.6	0.013	0.007	-0.147	-0.6	-1.0	-0.2	0.6	1.2
2000-01 to 2009-10										
SIH weekly income	-0.8	-1.8	0.007	0.030	0.524	-0.5	-0.1	0.1	0.0	0.5
HILDA	-0.5	-1.3	0.013	0.014	0.069	-0.6	-0.8	0.1	0.8	0.4

Note: Change in effect on the mean is expressed in percentage points.

8.4 Decompositions of income inequality by factor source

The decompositions presented in Section 8.3 indicate that much of the differences in inequality trends stem from wage and salary income, with non-wage market income also a contributing factor. However, the approach taken in these decompositions does not fully account for the extent to which each income component is concentrated in high-income households and, moreover, does not permit quantification of the relative magnitude of the contribution of each component. An alternative approach is to simultaneously decompose inequality measures by factor source—in this context, income taxes, government benefits, wages and other income—to quantify their relative contributions to overall inequality, and examine changes in their contributions. This is less transparent and in some ways less informative about the nature of changes, and we restrict analysis here to two key measures of overall inequality. However, the quantification of relative contributions, accounting for the correlation of each component with total household income, is valuable.

The two inequality measures that are decomposed are the Gini coefficient and half the squared coefficient of variation (I_2), a measure of overall inequality which is a member of the Generalised Entropy class of inequality measures. The income measure examined is household equivalised disposable income.

Gini decomposition

As shown by Lerman and Yitzhaki (1985), the Gini coefficient can be expressed as the sum of the contributions from each income component $k = 1,...,K$:

$$Gini(Y;v) = \sum_{k=1}^{K} \frac{\mu(Y^k)}{\mu(Y)} \times Conc(Y^k, Y; v) \qquad (1)$$

where $\mu(Y^k)$ is the mean of income from source k and $\mu(Y)$ is the mean of total income. $Conc(Y^k, Y; v)$ is the generalised concentration coefficient of income from source k with respect to total income. It measures the extent to which the income component is concentrated on individuals with high rankings in the distribution of total income and can be expressed as:

$$Conc(Y^k, Y) = -2Cov\left(\frac{Y^k}{\mu(Y^k)}, (1 - G(y))\right) \qquad (2)$$

where $G(Y)$ is the cumulative distribution function of total income Y.

Each income component's contribution is therefore equal to the product of the size of the income component relative to total income and the extent to which the component is concentrated on individuals highly ranked in the income distribution.

Shorrocks (1982) decomposition of I$_2$

The Shorrocks (1982) decomposition of half the squared coefficient of variation (I$_2$) produces the proportionate contribution of income component *k* to total inequality as measured by I$_2$:

$$s^k = \rho^k \left(\frac{\mu(Y^k)}{\mu(Y)}\right)\left(\left(\frac{I_2(Y^k)}{I_2(Y)}\right)^{0.5}\right) \qquad (3)$$

where ρ^k is the correlation between income component *k* and total income Y, and $\mu(Y)$ and $\mu(Y^k)$ are means of total income and income component k, respectively.

The proportionate contribution to overall inequality (as measured by I$_2$) is thus a function of the correlation of the income component with total income, the income component's share of total income, and inequality of the income component relative to total inequality. An income component with a positive value for s^k acts to increase inequality in total income, while an income component with a negative s^k value acts to reduce inequality of total income.

The left-hand panel of Table 14 presents the marginal contributions of each income component to the overall Gini coefficient, as well as changes over the 2000s. The right-hand panel of the table presents the contribution of each income component to I$_2$, and likewise also presents changes over the 2000s.[14] For all three series, the income variable decomposed is household equivalised disposable income. As in Section 8.2, to ensure that household equivalised disposable income is equal to the sum of the components,

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[14] The Stata command 'sgini' by Van Kerm (2009) is used to produce decompositions of the Gini coefficient and the Stata command 'ineqfac' by Jenkins (1999) is used to produce the Shorrocks decompositions of I$_2$.

negative non-wage market income is constrained to be no more than the sum of the other income components (wages and government benefits).

Table 14: Decompositions of inequality measures—Household equivalised disposable income

	Gini decomposition					Shorrocks decomposition of I_2				
	Taxes	Benefits	Wages	Other	Total	Taxes	Benefits	Wages	Other	Total
SIH annual income										
2001-02	-0.119	-0.051	0.423	0.074	0.327	-0.104	-0.022	0.247	0.085	0.206
2002-03	-0.116	-0.053	0.425	0.077	0.333	-0.109	-0.023	0.254	0.100	0.221
2004-05	-0.111	-0.050	0.419	0.094	0.352	-0.134	-0.023	0.276	0.139	0.258
2006-07	-0.110	-0.040	0.427	0.090	0.367	-0.118	-0.020	0.310	0.118	0.291
2008-09	-0.100	-0.041	0.405	0.088	0.351	-0.104	-0.020	0.268	0.113	0.257
Change 2001-02 to 2008-9	0.019	0.010	-0.017	0.013	0.024	-0.001	0.002	0.022	0.028	0.051
SIH weekly income										
2000-01	-0.132	-0.058	0.417	0.084	0.311	-0.097	-0.025	0.221	0.105	0.204
2002-03	-0.138	-0.056	0.418	0.085	0.309	-0.109	-0.024	0.235	0.104	0.207
2003-04	-0.129	-0.061	0.402	0.081	0.293	-0.088	-0.025	0.209	0.087	0.184
2005-06	-0.122	-0.056	0.392	0.092	0.306	-0.094	-0.024	0.210	0.127	0.220
2007-08	-0.113	-0.050	0.385	0.100	0.322	-0.115	-0.022	0.245	0.169	0.277
2009-10	-0.108	-0.054	0.378	0.097	0.313	-0.089	-0.023	0.210	0.161	0.259
Change 2000-01 to 2009-10	0.024	0.004	-0.039	0.013	0.002	0.008	0.002	-0.010	0.055	0.055
HILDA Survey										
2000-01	-0.134	-0.053	0.415	0.079	0.307	-0.091	-0.023	0.244	0.065	0.196
2001-02	-0.135	-0.054	0.408	0.086	0.305	-0.090	-0.023	0.232	0.076	0.196
2002-03	-0.134	-0.055	0.403	0.088	0.302	-0.093	-0.023	0.223	0.085	0.193
2003-04	-0.134	-0.057	0.398	0.091	0.298	-0.093	-0.024	0.213	0.087	0.183
2004-05	-0.134	-0.054	0.393	0.097	0.301	-0.098	-0.023	0.210	0.110	0.200
2005-06	-0.131	-0.053	0.380	0.108	0.304	-0.097	-0.022	0.211	0.111	0.203
2006-07	-0.129	-0.050	0.381	0.117	0.319	-0.089	-0.022	0.221	0.151	0.261
2007-08	-0.114	-0.048	0.377	0.096	0.310	-0.072	-0.020	0.203	0.105	0.215
2008-09	-0.111	-0.046	0.365	0.093	0.301	-0.068	-0.019	0.186	0.118	0.216
2009-10	-0.111	-0.049	0.380	0.089	0.309	-0.064	-0.021	0.206	0.094	0.215
2010-11	-0.111	-0.046	0.382	0.091	0.316	-0.070	-0.020	0.214	0.094	0.217
Change 2001-02 to 2008-9	0.023	0.008	-0.043	0.008	-0.004	0.021	0.003	-0.047	0.042	0.020
Change 2000-01 to 2009-10	0.023	0.004	-0.035	0.010	0.002	0.027	0.002	-0.038	0.029	0.020

Consistent with expectations, for all three income series and both inequality measures, the estimates show income taxes and benefits act to decrease inequality in any given year, while wages and other market income act to increase inequality. Also evident in all cases—and consistent with the evidence presented in Section 8.3—is that the effects of income taxes and benefits in reducing the Gini coefficient reduced over the decade. Furthermore, all three income series show similar magnitudes for the changes in the impacts of taxes and benefits on the Gini coefficient. The table further shows that the effects of benefits in lowering the I_2 measure of inequality diminished over the decade for all three series. A decline in the effects of income taxes in reducing the I_2 measure is also evident for the HILDA and weekly SIH series, but this is not evident for the annual SIH series. Moreover, the magnitude of the decline is considerably greater in the HILDA series than in the weekly SIH series.

Both the HILDA and weekly SIH series show changes in the distribution of wages across households had substantial inequality-reducing effects over the 2000s, acting to decrease the Gini coefficient over the period by approximately 0.04 in both series, and the I_2 measure by 0.01 in the weekly SIH series and by 0.04

in the HILDA series. The annual SIH series also shows wages acted to decrease the Gini coefficient over the period, but only by half as much—that is, by approximately 0.02. Further, the Shorrocks decomposition shows that wages actually acted to increase the I_2 measure by 0.02 for the annual SIH series.

The Gini decompositions for other market income highlight the importance of business cycle conditions and equity market performance to the impact of this component on inequality. For all series, the inequality-increasing effects peak in the mid-2000s, when economic growth and equity market performance were at their highest. This creates particularly difficulties in comparing the weekly and annual SIH series because of the sensitivity to timing, since there is only one year—2002-03—in which estimates are available for both series. However, it is nonetheless clear that non-wage market income was a substantial contributor to growth in inequality over the decade. The Gini decompositions indicate that non-wage market income was a bigger factor in inequality growth in the two SIH series than in the HILDA series. However, the I_2 decompositions show it was a bigger contributor to growth in inequality in the weekly SIH series than in the HILDA or annual SIH series.

While there are several consistent patterns that emerge from the Gini and I_2 decompositions, they also produce some conflicting evidence with respect to the effects of income taxes, wages and non-wage market income. The I_2 measure is relatively sensitive to extreme values, and for that reason the results of the Gini decompositions may be a better indicator of the contributions of the income components to inequality trends. Perhaps more pertinent is that the Gini coefficient has been the key measure of overall inequality adopted in this paper, and from this perspective the Gini decompositions are more relevant. Thus, taking the Gini coefficient as the preferred measure of overall inequality, the decompositions show for all three series that taxes and benefits acted to increase inequality over the decade, wages acted to reduce income inequality over the decade, and non-wage market income acted to increase income inequality over the decade. The effects for taxes and benefits were similar in magnitude across all three income series, but for wages the effects were smaller in the annual SIH series than in the other two series, while for non-wage market income the effects were larger in the two SIH series than in the HILDA series. Consequently, part of the reason for greater growth in inequality in the annual SIH series compared with the other two series is that there was a smaller inequality-reducing effect of changes in the distribution of wages across households, while part of the reason for greater growth in inequality in the two SIH series compared with the HILDA series is that there was a larger inequality-increasing effect of changes in the distribution of non-wage market income.
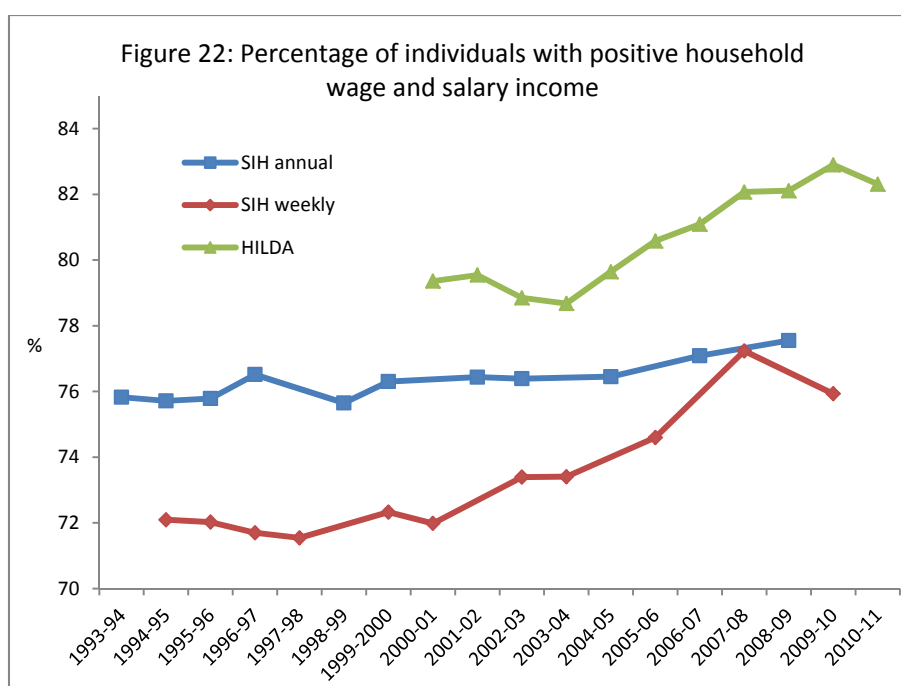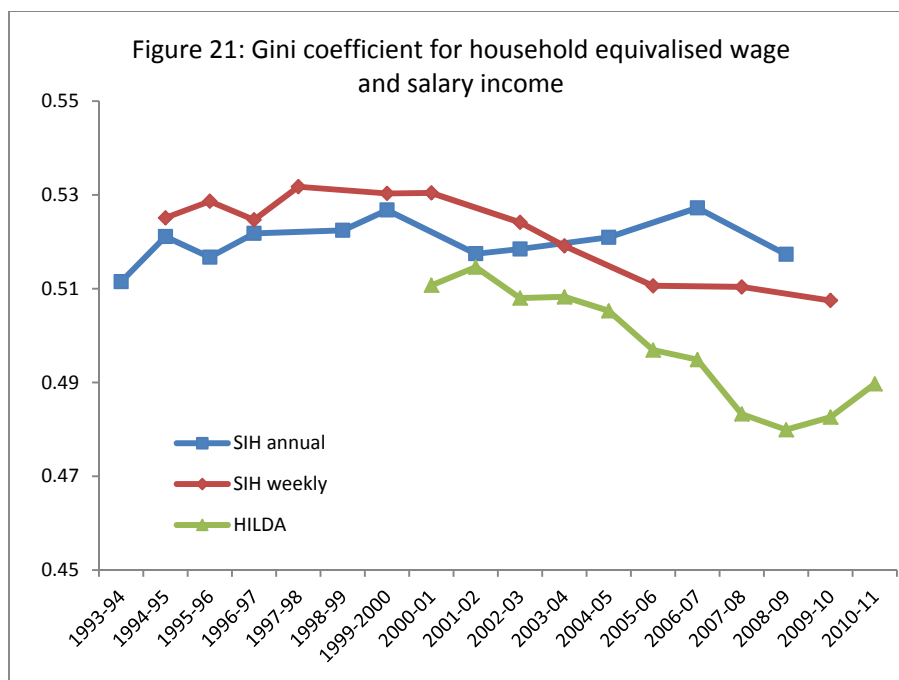
8.6 Distributions of components of income

To better understand the role played by income components in producing the inequality trends in income inequality, it is useful to examine the distributional changes in the components themselves. Table 15 presents key distributional statistics for the distributions of equivalised wage and salary income, equivalised government benefits and equivalised non-wage market income.

Table 15: Components of household equivalised gross income

	Equivalised wages			Equivalised benefits			Equivalised other income					
	% > 0	Mean	Gini coef.	% > 0	Mean	Gini coef.	% < 0	% > 0	Mean	Median	90th percentile	99th percentile
SIH annual income												
2001-02	76.4	31,679	0.52	58.2	4,319	0.68	5.7	61.0	5,953	77	19,930	73,857
2002-03	76.4	31,957	0.52	58.2	4,435	0.68	6.1	60.0	5,521	58	18,240	72,953
2004-05	76.4	34,479	0.52	55.0	4,458	0.69	6.0	69.5	6,739	162	20,992	87,171
2006-07	77.1	36,665	0.53	51.7	4,155	0.71	5.5	68.2	7,146	261	20,895	90,697
2008-09	77.6	37,299	0.52	90.8	5,529	0.60	7.7	71.5	6,614	212	19,878	94,547
SIH weekly income – Annualised												
2000-01	72.0	29,054	0.53	59.4	4,805	0.66	4.3	57.7	5,961	92	18,702	74,956
2002-03	73.4	30,466	0.52	58.0	4,683	0.67	5.6	55.6	6,135	66	19,818	81,269
2003-04	73.4	31,293	0.52	60.7	5,127	0.65	5.1	64.3	6,508	125	21,362	78,950
2005-06	74.6	34,338	0.51	61.8	5,288	0.64	5.2	70.8	7,692	202	24,045	93,521
2007-08	77.2	38,169	0.51	58.9	5,106	0.66	4.5	65.9	8,977	405	26,048	103,422
2009-10	75.9	37,432	0.51	58.5	5,561	0.66	6.0	64.7	8,050	299	23,944	103,710
HILDA Survey												
2000-01	79.4	32,809	0.51	69.4	4,979	0.62	5.7	64.7	6,125	315	20,092	73,284
2001-02	79.5	32,275	0.51	70.8	5,216	0.61	3.7	65.3	6,420	338	19,724	72,500
2002-03	78.9	32,863	0.51	69.6	5,100	0.62	4.9	64.4	6,226	295	20,006	79,116
2003-04	78.7	33,169	0.51	68.7	5,442	0.61	5.1	64.0	6,983	405	21,422	85,686
2004-05	79.6	34,554	0.51	69.4	5,487	0.60	5.3	64.8	7,592	473	23,082	90,934
2005-06	80.6	36,248	0.50	67.4	5,502	0.60	5.8	63.0	8,184	382	24,935	107,423
2006-07	81.1	38,299	0.49	66.3	5,452	0.61	5.6	63.8	8,611	427	24,440	141,842
2007-08	82.1	39,437	0.48	65.6	5,278	0.62	6.0	62.8	8,102	361	24,839	100,620
2008-09	82.1	39,960	0.48	96.4	6,617	0.54	5.8	63.8	7,710	371	22,517	100,434
2009-10	82.9	41,043	0.48	65.3	5,528	0.64	6.1	64.1	7,752	311	22,478	123,092
Change 2001-02 to 2008-09												
SIH annual	**1.1***	5,619*	0.00	32.6*	1,210*	-0.08*	2.0*	**10.5***	661*	135*	-52	20,690*
HILDA	**2.6***	7,685*	-0.03*	25.7*	1,401*	-0.07*	2.1*	**-1.5***	1,291*	33	2,793*	27,934*
Change 2000-01 to 2009-10												
SIH weekly	**3.9***	8,378*	-0.02*	-0.9	757*	0.01	1.7*	**6.9***	2,089*	207*	5,242*	28,754*
HILDA	**3.5***	8,234*	-0.03*	-4.0*	549*	0.02*	0.4	**-0.6**	1,627*	-4	2,386*	49,808*

Note: * indicates the estimated change is significantly different from zero at the 5 per cent level, based on 1,000 bootstrap samples.

The table shows that inequality in the distribution of wages across households, as measured by the Gini coefficient, decreased significantly for the HILDA and weekly SIH income measures, but did not change for the annual SIH income measure. Figure 21, which presents graphs of the Gini coefficients for equivalised wage and salary income, shows that the decline in the weekly SIH series followed a relatively stable period from 1994-95 to 2000-01, when there was a very slight net increase in the Gini coefficient for equivalised wages. Further, between 1994 and 2000, the SIH shows inequality in annual household wage and salary income followed a similar path to inequality in weekly household wage and salary income. It is only in the 2000s that their paths significantly diverge.

Figure 21: Gini coefficient for household equivalised wage and salary income

Figure 21: Gini coefficient for household equivalised wage and salary income

Figure 22: Percentage of individuals with positive household wage and salary income

Figure 22: Percentage of individuals with positive household wage and salary income

Potentially a big factor in the decline in inequality in the distribution of wages across households in the weekly SIH and HILDA series is the sizeable growth in household employment, as indicated by the proportion of households with positive wage and salary income (first column of Table 15 and Figure 22). The proportion in the SIH with household wage and salary income in the current week rose by 3.9 percentage points between 2000-01 and 2009-10, which is the same as the 3.9 percentage point increase in the proportion with annual household wage and salary income in the HILDA Survey. Significantly, employment growth was considerably stronger in the weekly SIH and HILDA than in the annual SIH, helping to explain why inequality in the distribution of wages across households did not decline for the SIH annual

income measure. Between 2001-02 and 2008-09, the proportion of individuals in the SIH with annual household wage and salary income rose by 1.1 percentage points, compared with 3.6 percentage points in the HILDA Survey.

It is not clear why the SIH should show greater current-week employment growth than previous-financial-year employment growth, although it is certainly possible. To further investigate employment changes over the decade to 2010, Table 16 presents employment-population rates at both the individual and household level, for both the SIH and the HILDA Survey. For the purposes of this analysis, 'employment' is defined by the existence of positive wage and salary income rather than by labour force status, which is not measured by the SIH on a financial-year basis. As might be expected, employment rates for the whole of the previous financial year are higher than current-week employment rates, at both the individual and household level. The HILDA data shows higher individual and household employment rates than the SIH, for both the current week and previous financial year. It also shows a greater differential between previous-financial-year and current-week employment rates. These differences may be related to the timing of the HILDA Survey, which is mostly conducted between September and December of the survey year, compared with the whole of the financial year for the SIH. However, ABS Labour Force Survey (LFS) data (Catalogue No. 6202.0) shows employment rates tend to be higher in the December quarter than in other quarters. It may therefore be that under-reporting of previous-financial-year employment is more prevalent in the SIH than in the HILDA Survey. One potential reason for this is that the SIH has a longer average recall period for previous-financial-year employment, since most HILDA interviews are conducted one to four months after the end of the financial year, whereas the SIH are conducted over the course of the entire following financial year.

More significant is that, while the HILDA Survey and the SIH show similar rates of growth in individual and household employment in the current week, the growth in previous-financial-year employment, at both the individual and household level, is markedly lower in the SIH than in the HILDA Survey, which has growth in financial-year employment that is similar to its current-week employment growth.

Table 16 also presents ABS estimates from the LFS, which are not perfectly comparable because the SIH and HILDA definitions exclude employed people with no wage or salary income, which could occur for reasons such as temporary unpaid leave, self-employment with no wage earnings, and being an unpaid family helper. (This can help explain why the employment rates are lower in the SIH and the HILDA Survey than in the LFS.) Furthermore, the LFS employment series has limited use for the purposes of establishing the veracity of the SIH and HILDA data, since it tells us nothing about how employment is distributed across households, or about annual employment rates. The series does, however, confirm that changes in current-week employment rates in the SIH and the HILDA Survey are both consistent with the best data there is on employment-population rate changes. The question that remains unanswered is whether the relatively low growth in annual employment rates in the SIH is explicable by changes in the labour market, such as growth

in the average length of employment spells. If so, then the case could be made that the SIH more accurately represents changes in previous-financial-year employment-population rates than the HILDA Survey. If not, it would suggest that the SIH is increasingly failing to capture previous financial year employment income.

Table 16: Individual and household employment-population rates—Current week and previous financial year

	Employment rates of individuals aged 15 years and over				Household employment rates (among all individuals)		
	Current (1)	Previous financial year (2)	Difference ((2) − (1))	LFS – average over survey period	Current (1)	Previous financial year (2)	Difference ((2) − (1))
SIH – Survey year							
2002-03	52.9	57.5	4.6	59.7	73.4	76.4	3.0
2003-04	53.8	57.1	3.3	59.8	73.4	76.4	3.0
2005-06	55.1	57.4	2.3	61.4	74.6	76.5	1.9
2007-08	57.1	57.3	0.2	62.7	77.2	77.1	-0.1
2009-10	55.8	57.9	2.1	61.8	75.9	77.6	1.6
Change 2002 to 2009	2.9	0.4	-2.5	2.1	2.5	1.1	-1.4
HILDA – Survey year							
2001	55.3	60.6	5.3	59.2	75.2	79.4	4.2
2002	55.9	61.1	5.3	59.7	75.5	79.5	4.0
2003	56.2	61.3	5.1	59.9	75.7	78.9	3.2
2004	55.8	61.0	5.2	60.5	75.1	78.7	3.5
2005	56.3	62.0	5.6	61.4	75.9	79.6	3.8
2006	57.4	62.5	5.1	62.1	76.6	80.6	4.0
2007	58.4	63.2	4.8	62.7	78.1	81.1	2.9
2008	59.1	64.1	5.1	62.8	78.3	82.1	3.7
2009	58.2	64.3	6.1	61.8	78.4	82.1	3.7
2010	58.7	64.4	5.6	62.5	79.1	82.9	3.8
2011	57.9	63.7	5.8	62.3	78.4	82.3	3.9
Change 2002 to 2009	2.3	3.1	0.8	2.1	2.9	2.6	-0.4
Change 2001 to 2011	2.5	3.1	0.6	3.1	3.3	3.0	-0.3

Notes: 'Previous financial year' is the year before that indicated by the row heading for the SIH; for the HILDA Survey, it is the financial year ending in the year given by the row heading. *LFS*—Labour Force Survey. LFS estimates are simple means of the original series (ABS Catalogue No. 6202.0, Time Series Spreadsheets, Table 3; released 13/6/13) over the relevant survey period (the financial year for the SIH, and assumed to be September to December of the indicated year for the HILDA Survey).

In addition to differences in changes in employment rates, changes in earnings inequality amongst employed persons is a further potential source of divergence in trends in overall income inequality across the income series. This is briefly considered in Figure 23, which presents the Gini coefficient for the distribution of gross wage and salary income among employed persons. It shows that differences in earnings inequality trends are indeed a source of divergence between the two SIH series on the one hand, and the HILDA Survey on the other. The two SIH series show a rise in the Gini coefficient over the 2000s up to around 2007, whereas the HILDA Survey shows little net change. Again, however, the rise in inequality is predominately in the period in which the changes to survey methods and income concept were being made by the ABS, casting doubt on the extent to which the growth reflected real increase in earnings inequality. Also notable is that, in the early 2000s, the HILDA Survey had higher earnings inequality than the annual SIH, with the growth in inequality in SIH annual earnings bringing it up to the level of earnings inequality in

the HILDA Survey. Consequently, the annual earnings distributions from the two data sources look more alike at the end of the decade than they did at the start.[15]

Figure 23: Gini coefficient for personal wage and salary income of employed persons
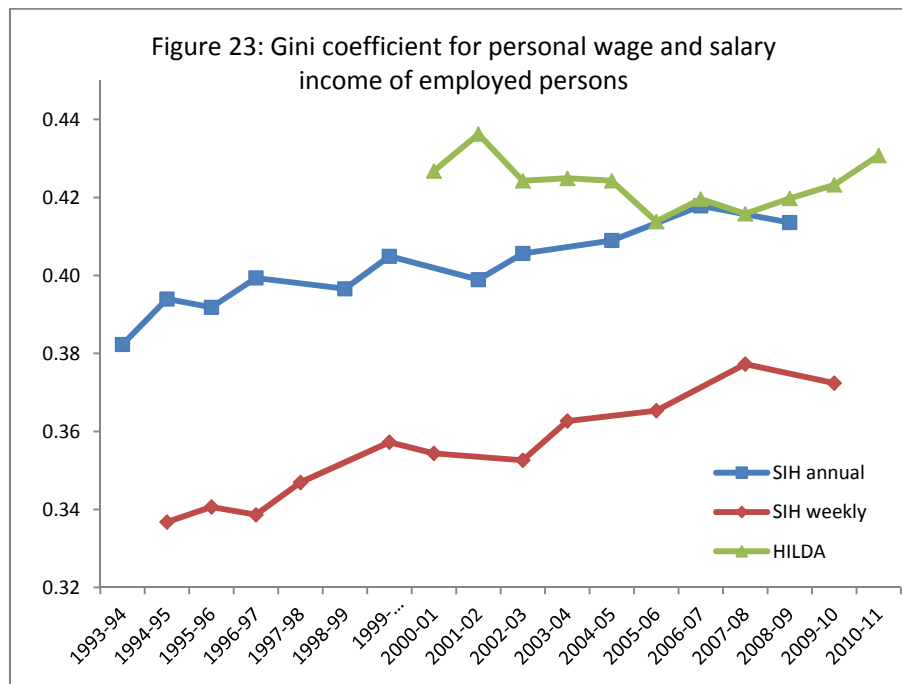
Returning to Table 15, a further key finding is the remarkable surge in the proportion of individuals with positive household non-wage market income evident for weekly income in the SIH conducted in 2003-04 and for both weekly and annual income in the SIH conducted in 2005-06 (which shows up in the 2004-05 estimate for the annual SIH income series). For the weekly SIH income measure, the proportion with positive non-wage market income rises from 55.6 per cent in 2002-03 to 64.3 per cent in 2003-04 and then rises again to 70.8 per cent in 2005-06. For the annual SIH income measure, the proportion with positive non-wage market income rises from 60.0 per cent in 2002-03 to 69.5 per cent in 2004-05. The HILDA Survey, by contrast, shows little change in the proportion of individuals with positive non-wage market income over the decade and in fact shows a slight decline between 2004-05 and 2007-08. Figure 24 shows graphically the scale of the SIH increases relative to HILDA and to all preceding SIH conducted from 1994-95.

The shift in 2003-04 to measuring current weekly business and investment income based on respondents' estimates of expected income in the current year could explain the rise between 2002-03 and 2003-04 in the weekly SIH series, but the reasons for the increase in the 2005-06 survey, affecting the 2004-05 annual SIH estimates and the 2005-06 weekly SIH estimates, are not clear. Irrespective of the reasons, the growth in the proportion of individuals with positive household non-wage market income is highly suggestive of improvements in ABS survey methods and concepts leading to better capture of such income. The sizeable

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[15] As should be expected, there is less inequality in SIH weekly earnings, since part of the inequality in annual earnings will derive from differences across individuals in the number of weeks worked over the course of the year.

jumps in median non-wage market income in the 2003-04 and 2005-06 surveys, shown in Table 15, are also consistent with improved measurement of non-wage market income.

Figure 24: Percentage of individuals with positive household non-wage market income
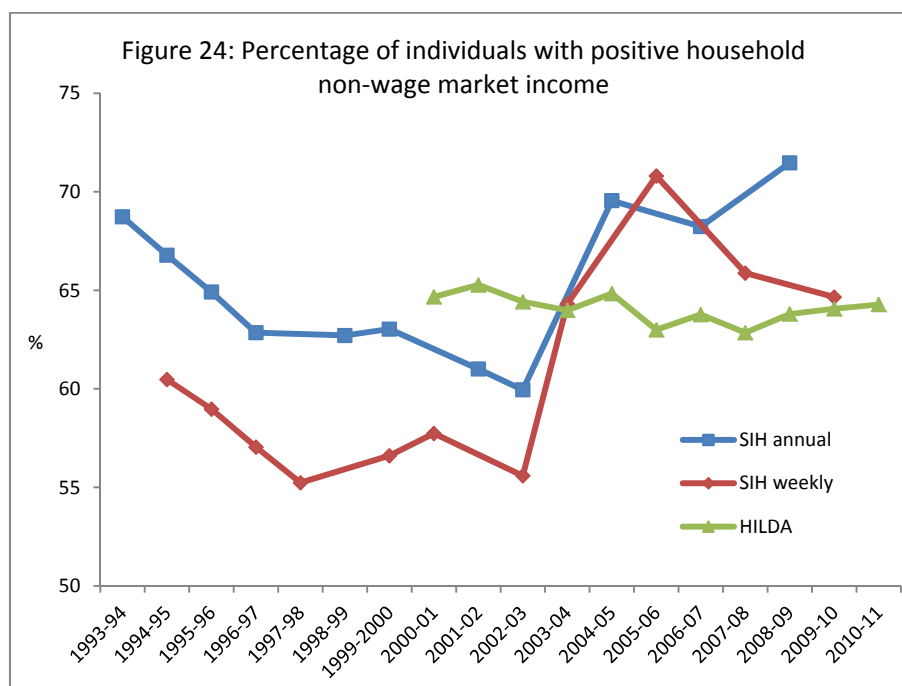
9. Conclusion

Obtaining an accurate picture of income inequality trends is a basic precondition for appropriate policy formulation. It forms an important part of the narrative of what is happening in a society and underpins public discourse and the policy prescriptions advocated by commentators and policy makers themselves. Accurate data is also a precondition for appropriate further empirical analyses, for example of the implications of inequality for various economic and social outcomes. In principle, ascertaining inequality trends should not be difficult, yet it is in fact not so straightforward. In practice, the data sources used to determine inequality trends are subject to a range of sources of error, and the errors in these data sources can change over time, resulting in inconsistencies that confound identification of real changes as distinct from changes induced by those inconsistencies.

The SIH is the primary source of information on the distribution of income in Australia and therefore has particular importance in informing debate and policy. It shows a dramatic increase in income inequality in the decade to 2010, which would cause considerable alarm among many people in the community if this was true. However, the growth in inequality was almost certainly considerably less than indicated by the two SIH income series. This holds even when the notionally consistently-measured SIH income variables are examined, not only because it is not possible to control for the effects of some changes to survey methods, such as the switch to computer-assisted interviewing, but also because of the potential for 'spillover' effects, whereby changes in the survey instruments in respect of one income component affect reporting of other income components.

The patterns evident in income components in the SIH, and the independent evidence provided by the HILDA Survey, tax records data and the National Accounts, are consistent with at least part of the increased inequality evident in the ABS data deriving from methodological and conceptual changes rather than from true increases in inequality. In particular, the main points of divergence in trends between the HILDA Survey and the ABS income surveys are restricted to the 2002-03 to 2007-08 period—and especially the 2003-04 to 2005-06 period. Tax data similarly shows considerably less growth in top income shares over the 2000s than the SIH data. Moreover, the two SIH income series themselves present conflicting stories on inequality trends. Most notably, between 2001-02 and 2004-05, they show very different changes in inequality, with inequality in weekly income decreasing sharply and inequality in annual income increasing sharply. Consistent with these divergent trends, comparisons of the SIH with National Accounts aggregates show improved capture of weekly income over this period, but a slight decline in capture of annual income.

The uncertainty concerning inequality trends stems from ambiguity about the effects of both changes to household wages and changes in the effects of investment and business income. Both the SIH and HILDA Survey show that employment growth over the decade as a whole helped to reduce income inequality, but the effect was considerably weaker for SIH annual income than for SIH weekly income or HILDA Survey annual income. There are reasons to favour the employment data in the SIH over the employment data in the HILDA Survey, given the declining representativeness of the HILDA Survey as the decade progressed. However, the available data, including ABS Labour Force Survey data, provide strong suggestions that the annual income measure in the SIH did not fully capture the employment growth—something which could help explain the slight decline in annual income capture that occurred despite the changes to survey methods that might have been expected to improve income capture. Further, the SIH show that the wage distribution among employed persons became more unequal, but the absence of a similar increase in inequality in the HILDA data, combined with the fact that much of the increase occurred when methods and concepts were changing, including the move to measuring salary sacrificed income, means we cannot be certain of the veracity of this trend. Looking to other ABS earnings data collected over the early to mid 2000s unfortunately cannot resolve this uncertainty, because all ABS surveys conducted over this period experienced the same changes in wage measurement.

Business and investment income was quite volatile over the decade, and inferences are sensitive to the particular start and end years examined. It would therefore be unwise to assert any longer-term trend growth (or decline) in the contribution of business and investment income to inequality. There is, furthermore, strong circumstantial evidence that the growth in contribution to inequality evident in the two SIH series after 2003-04 was to a significant extent due to better capture of this income component following changes to survey methods and income concept. The sharp rise in the median value of non-wage market income in the mid-2000s, and the even sharper rise in the proportion of individuals with positive

household non-wage market income, are too large and sustained to plausibly reflect real distributional change.

We are therefore left with the somewhat unsatisfactory conclusion that it is not possible to produce definitive estimates of income inequality trends between 2001 and 2010. There are, however, some seemingly unambiguous facts about income distribution changes over the decade. No data source shows inequality decreasing, and indeed there is agreement between the weekly SIH, annual SIH and the HILDA Survey that inequality increased from approximately 2003-04 to 2007-08—albeit by differing magnitudes— and then decreased in the next two years. In addition, all three series show that changes to income taxes and to government benefits acted to increase income inequality over the decade. The three series also show that employment growth up to 2007-08 reduced inequality, although the magnitude of the effect is in dispute. There are, furthermore, reasons to be optimistic that the SIH series are comparable across time from the 2007-08 survey onwards, since ABS methods and its income concept have been relatively stable across the three surveys conducted since then. The changes introduced in the period up to 2007-08 are also likely to have improved household income measurement, and thereby be providing a more accurate picture of the income distribution than was the case at the start of the decade. The HILDA Survey shows inequality rose steeply between 2009-10 and 2010-11; it will be interesting to observe whether the 2011-12 SIH (not yet released at the time of writing), which should be comparable with the two previous SIH, confirms this rise.

The conflicting evidence on income inequality in Australia over the decade to 2010 presented in this study provides a graphic illustration of the problem of measurement error for ascertaining trends in income distributions over time. It highlights the value of having available multiple independent sources of data on which to draw to help distinguish real change from measurement error-induced change. But it also reinforces the need for data providers to be cognisant of the importance of consistency in data over time. Indeed, significant but stable measurement error may often be preferable to modifications to survey methods and concepts that change the extent and nature of measurement error over time, even if the net effect of the modifications is to reduce the overall extent of measurement error. It is therefore to be hoped that future revisions to ABS concepts and survey methods for its household income survey collections will be kept to a minimum.

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