

# The Relationship between Income, Wealth and Age in Australia

---

Alan Tapper, Alan Fenna \*

Adjunct Research Fellow, John Curtin Institute of Public Policy, Curtin University,  
Bentley, 6102, Australia.

\*Correspondence: A.Fenna@curtin.edu.au

---

## Abstract

This article analyses the relationship between income, wealth, wealth-adjusted income, and age in Australia using a 2009–10 cross-sectional data set. The main findings are: (1) wealth and wealth-adjusted income generally rise with age, while income is constant across the life cycle; (2) both income inequality and wealth inequality rise until mid-life and fall thereafter, while wealth-adjusted income inequality depends on the method of calculation used, one showing a fall in later life and another showing no fall; (3) after income, wealth and wealth-adjusted income inequalities are adjusted for age, underlying inequality is lower in all three cases.

JEL Subject Codes: D63, I31

Keywords: economic inequality, wealth-adjusted income, age.

This is the author manuscript accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/aere.12326](https://doi.org/10.1111/aere.12326).

This article is protected by copyright. All rights reserved.

---

## Short Description

This article analyses the relationship between income, wealth, wealth-adjusted income and age using a 2009–10 Australian cross-sectional data set, showing results for inequality, and underlying age-adjusted inequality.

---

## Introduction

In *Capital in the Twenty-First Century*, Thomas Piketty (2014, pp. 244–46) observed that ‘The distribution of capital ownership (and of income from capital) is always more concentrated than the distribution of income from labor’. He adds that ‘Inequalities with respect to labor usually seem mild, moderate, and almost reasonable ... In comparison, inequalities with respect to capital are always extreme’. He then considers the possibility that ‘wealth is accumulated for life-cycle reasons (saving for retirement, say)’. If this were the case, then, he suggests:

inequality of wealth would be a simple translation of income from labor and would as such have only limited importance, since the only real source of social inequality would be inequality with respect to labor.

While acknowledging that this is theoretically possible, he discounts it on the grounds that the very high concentration of capital is far in excess of what would arise from the needs for life-cycle or precautionary saving.

The question raised here is how to explain the relationship between income inequality and wealth inequality. Is wealth inequality simply a function of income inequality, though more highly concentrated because accumulation across the life-cycle generates its own component of inequality? Or is it generated by other factors? To examine this question, we need to disentangle the elements that compose the

problem Piketty has posed. In this paper we attempt to do this using the Australian Bureau of Statistics' 2009–10 Household Expenditure Survey data set (ABS, 2012).

---

## Background and Literature

Wealth and income are typically considered in isolation from one another. While this is understandable from a practical perspective, since calculating their joint effects is difficult, economic well-being must be seen as their joint product. The case is similar with regard to economic inequality: income inequality and wealth inequality are treated as separate matters, leaving us unclear about their joint result. It is not even clear whether income and wealth are strongly correlated. Neither the joint product or the joint inequality of income and wealth are well explored, in Australia or elsewhere. According to Jantti and colleagues (2008, p. 3), analysing five OECD countries, 'household net worth and disposable income are highly, but not perfectly correlated across people within each country'. But according to Headey and colleagues (2008, p. 13), analysing Australian data,

only moderate correlations are found between wealth and income. In HILDA [Household, Income and Labour Dynamics in Australia], the correlation of household net worth with household gross income was 0.35, and with net income it was 0.34.

The authors added that 'Such correlations may seem surprisingly low, but similar results are found in other Western countries', citing Klevmarcken, Lupton and Stafford (2003). Creedy and Tan (2007) found a positive correlation for Australia, but did not quantify it. Saunders, Bradbury and Wong (2016) did not report correlations for their Australian study.

Much more informative than mere correlations are analyses that integrate income and wealth into a single metric — which, in the best-known study of this kind (Wolff and Zacharias, 2009), is referred to as ‘wealth-adjusted income’. Wolff and Zacharias’s analysis produced results they described as ‘quite dramatic’ in its life-cycle findings. ‘The effect of using wealth-adjusted income instead of money income is to increase the relative wellbeing of older groups relative to younger ones’ (Wolff and Zacharias, 2009, p. 93). The present study will use Australian data to track income, wealth and wealth-adjusted income across the life cycle, with the aim of testing those findings.

Wealth generally accumulates with age. Simply put, ‘Some people have little wealth because they have not had time to acquire more’ (Travers and Richardson 1993, p. 71). Given more time, those people can be expected to acquire more. In addition, bequests and inheritance tend to favour those in the second half of life. Australian studies using Household, Income and Labour Dynamics in Australia (HILDA) data demonstrate that ‘asset holdings are heavily concentrated in the hands of older households — those within 20 years of retirement and those 10 to 15 years post-retirement’ (Headey and colleagues, 2008, p. v; see also 15, Table 5).

Two contrasting results show through clearly ... The first is the strong dependence of wealth on age or, really, time spent saving and investing. The second which, while not contradictory, points in a different direction — that is, even within age cohorts there are great disparities in wealth.

The relation between these two findings is a central theme of the present article.

It is also well known that wealth inequality is about twice as high as income inequality. Wolff and Zacharias (2009) found that counting wealth as part of income resulted in higher levels of inequality than that shown for income alone. Given that

wealth is concentrated at the end of life, we might expect economic inequality to rise with age. But that cannot be determined simply from wealth distribution figures.

Rather, we need figures combining wealth and income distributions — that is, we need to know the distribution of wealth-adjusted income across life. Creedy and Tan (2007) found that income-and-wealth inequality *falls* as age increases. We can test this thesis using Gini coefficients for wealth-adjusted income as the metric.

A further topic in this paper is the role that age plays in economic inequality. While the distribution of wealth-adjusted income is a better indicator of economic inequality than either income or wealth measures, there is still a case for taking the analysis one step further. Economic equality need not imply equality between individuals at different stages of the life-cycle. It may be interpreted as obtaining simply when all families at the same stage in the life cycle have the same wealth-adjusted income. We can call this ‘age-adjusted equality’ and think of it as ‘underlying inequality’. To calculate age-adjusted inequality we need to factor out the contribution of age to inequality. We attempt to do this in the later part of this paper.

Overall, then, we seek to answer three questions:

- (1) How do income, wealth and wealth-adjusted income change with age (stage in the life cycle)?
- (2) How do the distribution of income, wealth and wealth-adjusted income change with age (stage in the life cycle)?
- (3) What is the underlying level of income, wealth and wealth-adjusted income inequality if we factor out the contribution of age?

---

## Methods

Income and wealth and their distributions are increasingly familiar topics. In this study we focus on household final income, defined as a combination of disposable

income, household taxation (direct and indirect), and the value of non-cash social expenditures on health, education and housing. By wealth we mean household net worth. Wealth-adjusted final income — a less familiar concept — is defined as the combination of monetary income, household taxation, the value of in-kind social services, and the value of annuitised net worth.

This study integrates household final income and wealth data from the ABS Household Expenditure Survey microdata for 2009–10, a survey with a sample size of 9774 households. In what follows, all dollar values will be expressed as 2015 dollars. Income figures will be shown as weekly income. In considering the age dimension we follow ABS practices. Households are allocated to age categories by the age of the household ‘reference person’. That is the person with the highest tenure when ranked as follows: owner without a mortgage, owner with a mortgage, renter, other tenure; one of the partners in a registered or *de facto* marriage, with dependent children; one of the partners in a registered or *de facto* marriage, without dependent children; a lone parent with dependent children; the person with the highest income; the eldest person. (The analysis we present is not strictly of differences in income across age groups; rather, it shows differences across households by age cohort of head of household.) We follow the ABS age group classifications, in ten-year intervals: 15–24, 25–34, 35–44, 45–54, 55–64, 65–74, and 75 and older.

The term ‘wealth-adjusted income’ was introduced by Wolff and Zacharias (2009). Earlier studies had referred to an ‘income–net worth’ approach to measuring economic well-being (Weisbrod and Hansen, 1968) and to the ‘joint distribution of income and wealth’ (Wolfson, 1979). The general strategy of these studies has been to convert net worth (a stock) to income (a flow) by annuitisation, and then to sum monetary and annuity incomes to arrive at ‘wealth-adjusted income’. The resulting

'lifetime annuity' is a function of net worth, the real interest rate, the number of years until death, and the future value at end-of-life. It is constant across time, and sufficient to exhaust the initial net worth at death. The year of death of the household reference person has been set at age 92, a decision based on evidence that life expectancy at age 85 is 6 years for men and 7 years for women (ABS, 2013a).

An alternative method of calculating annuities is the 'bond coupon' method, which simply calculates the annuity as a percentage of household net worth. We will call this the 'fixed rate' method. As we will see, the two methods arrive at quite different results for households in later life, so it is worthwhile showing both calculations. Here we use a 4 per cent real interest rate to calculate the annuity. A 2015 Actuaries Institute study used a 4 per cent rate to estimate the capital value of the Age Pension (Actuaries Institute, 2015, p. 47). We follow their example. We also note that in the period 2005–06 to 2009–10 household net worth was growing at about 3 per cent per annum, while immediately before 2005–06 the growth rate was around 6 per cent (ABS 2013b, Table 1).

We count the value of home equity and the value of superannuation in the annuity calculation. The full value of home equity is not fully captured by imputed rents. In order to avoid double counting we subtract income derived from assets from final income. There are five types of income from assets: own unincorporated business income; income from investments; income from superannuation, annuities and private pensions; net imputed rent; and 'other regular income'. Finally, we adjust for household size using the modified OECD equivalence scale. We take equivalent wealth-adjusted final income as the most basic measure of economic well-being.

There is some disagreement about whether wealth figures should be equivalised (Cowell and van Kerm, 2015, p. 5). We take the view that equivalisation

of wealth is appropriate, for the same basic reason that the equivalisation of income is appropriate, namely that current economic well-being varies with household size. This is in line with Cowell and van Kerm's suggestion (2015, p. 5) that 'if ... one is willing to interpret wealth as the ability to finance current consumption, arguments for applying equivalence scales are strong'. However, we also show non-equivalent net worth figures when examining distribution. It turns out that equivalisation makes little difference to distribution.

---

## Results

### 4.1 Household Income and Wealth across the Life Cycle

What happens, then, when we combine income and wealth in the form of wealth-adjusted final income across the life cycle? The overall findings are shown in Table 1 and Figures 1 and 2. Table 1 and Figures 2 and 3 compare two measures of income and one measure of wealth with two measures of wealth-adjusted income.

There are clear patterns in the five trajectories shown in Figures 1 and 2. In Figure 1, equivalent disposable incomes are constant up to age 64 and fall sharply thereafter. Equivalent final incomes remain much the same across the life cycle. The two types of equivalent wealth-adjusted final incomes rise together with age, but diverge in later life, with the fixed rate annuity type levelling off while the lifetime annuity type rises with age. The difference between equivalent disposable and equivalent final income in the latter age brackets is probably accounted for by government expenditure on health, which is included in final income but not in disposable income.

In Figure 2, equivalent net worth rises sharply with age, then tapers off in later life. In rough terms, the average household headed by a 25-year-old reference person



will have an equivalent net worth one-sixth that of the average 70-year-old headed household. By contrast, the average 25-year-old headed household will have an equivalent wealth-adjusted income about two-thirds that of the average 70-year-old headed household.

The sharp divergence between the two forms of equivalent wealth-adjusted final income in later life is explicable by the effect of lifetime annuitisation, whereby each dollar of net worth gains in annuity value as the end of life approaches, whereas fixed rate annuities do not change with age.

#### 4.2 The Distribution of Household Income and Wealth Within and Between Age Groups

What is the distribution pattern of income and wealth within and between age groups? Does inequality increase or diminish with age? Table 2 and Figure 3 show this distribution for six measures of income and wealth, using Gini coefficients as the summary statistic for the calculation of inequality. A Gini coefficient of zero represents perfect equality, while a Gini coefficient of one represents perfect inequality.

Table 2 and Figure 3 show that at all ages net worth and equivalent net worth are distributed much more unequally than equivalent disposable income, equivalent final income and equivalent wealth-adjusted income. This is unsurprising. We also observe little difference between the distribution Ginis for net worth and equivalent net worth. Hereafter, we will ignore net worth and focus on equivalent net worth. Table 2 and Figure 3 show equivalent net worth inequality as steady until age 45–54 and falling thereafter.

Table 2 and Figure 3 also show the pattern across the life cycle for five kinds of income. Broadly speaking, inequality in the distribution of equivalent disposable income, equivalent final income, and both forms of equivalent wealth-adjusted final income rises until around age 60, but then four of the five indicators fall markedly. The exception is the distribution of equivalent wealth-adjusted final income (4 per cent lifetime annuity), which stays around a Gini of 0.300 through life.

#### 4.3 Underlying Inequality

We return now to the inequality issue. Are the inequality findings shown in Table 2 and Figure 3 capturing real underlying inequality? Underlying inequality is what analyses of inequality are usually intended to capture, since it is underlying inequality that provides a *prima facie* indicator of real differences in economic wellbeing. From this perspective, age is a confounding variable, one we would wish to eliminate. As Paglin (1977, p. 523) put it, inequalities ‘related purely to the stage in the life cycle are considered normal, functional, and compatible with long-term equality conditions’. We will take this point as given, and ask the question it prompts: what would the distributions be if we were to factor out the age component?

To factor out the inequality due simply to age we need first to quantify the age component of the overall inequality measure, which will now be referred to as the “L-Gini” (or “Lorenz-Gini”). Paglin (1975) proposed a method for calculating what he called the “age-Gini”: it is simply the Gini for the weighted means of income or wealth of the given age categories. It measures the inequality that would exist if there were no variance around the mean income of the age cohorts. Paglin (1975, p. 602) contended that perfect equality consisted in ‘equal incomes for all families at the same stage of their life cycle, but not necessarily equal incomes between different age

groups'. He contended that underlying, or age-neutral, inequality is found by subtracting the age-Gini from the L-Gini, the result being termed the P-Gini. The P-Gini for the ABS data is therefore the L-Gini minus the age-Gini, with the age-Gini calculated as the Gini for the weighted means for the seven ABS age categories.

Formby and Seaks (1980) proposed a modification of Paglin's P-Gini, the "modified-Paglin Gini" or "MP-Gini". They accepted Paglin's contention that the P-Gini is an improvement over the L-Gini, but argued that Paglin misconstrued the calculation of age-neutrality. Paglin's "P-curve" is the line away from the Lorenz line of equality that signifies the contribution of age to inequality (see Paglin, 1975, p. 599, Figure 1B). The P-Gini, said Formby and Seaks (1980, p. 480, italics in original),

measures the ratio of the deviation of the actual income distribution away from the P reference curve *relative to the income which could be equally distributed if the age-income profile were perfectly flat.*

By contrast, the MP-Gini 'measures the ratio of the deviation of the actual income distribution from the P reference curve *relative to the income which could be equally distributed given the age-income profile*'.

Figure 4 illustrates the relation between the L-Gini, the age-Gini, the P-Gini and the MP-Gini. (It is based on Figure 1, in Formby and Seaks, 1980, p. 480.) The diagonal line E represents perfect equality. Line L shows the Lorenz curve, the standard device for representing Ginis. Paglin's P-Gini is represented by line P. Line P divides the area of Lorenzian inequality into two parts, designated  $\alpha$  and  $\beta$ . As Formby and Seaks (1980, p. 480) put it, 'The area  $\alpha$  shows that part of the Lorenzian inequality which is traceable to the age-income profile. The area  $\beta$  shows the

Lorenzian inequality which is not attributable to the age-income profile'. Using this conceptualisation, the formulae for calculating the various Ginis are as follows.

$$\text{L Gini} = \frac{\alpha + \beta}{\alpha + \beta + \gamma} \qquad \text{Age Gini} = \frac{\alpha}{\alpha + \beta + \gamma}$$

$$\text{P Gini} = \frac{\beta}{\alpha + \beta + \gamma} \qquad \text{MP Gini} = \frac{\beta}{\beta + \gamma}$$

Table 3 shows the L-Ginis, age-Ginis, P-Ginis and MP-Ginis for disposable income, final income, wealth and two kinds of wealth-adjusted income (all equivalised) using the 2009-10 data set.

Table 3 can be interpreted as showing five results:

- in all cases the MP-Gini is higher than the corresponding P-Gini and the reduction in inequality relative to the L-Gini is significantly less;
- age-neutral equivalent disposable income inequality is lower by around one-third (between 24 and 35 per cent reduction) as compared with standard calculations of Ginis for equivalent disposable income;
- age-neutral equivalent final income inequality is lower by around one-sixth (between 13 and 17 per cent reduction) as compared with standard calculations of Ginis for equivalent final income;
- age-neutral equivalent wealth inequality is considerably lower than shown in standard calculations, down by somewhere between 30 per cent and 57 per cent;
- equivalent wealth-adjusted final income is also substantially lower when age-neutrality is imposed, down by somewhere between 21 per cent and 41 per cent.

Remarkably, the P-Ginis and MP-Ginis for equivalent wealth-adjusted final income are at levels that would be considered very low in regular calculations of household disposable income inequality.<sup>1</sup>

#### 4.4 Age-cohort Inequality

Table 2 and Figure 3 show that wealth inequalities within age groups are as high as they are across the whole distribution. The L-Gini coefficients for equivalent net worth within the first four age groups slightly exceed that for the population as a whole (L-Gini = 0.583), and only after age 55 do they fall below the population average. In general terms the L-Ginis scores within age groups are as high as the score for the whole distribution. This seems paradoxical, if age-neutral wealth inequality is as low as shown in Table 3. Table 2 also shows that equivalent final income L-Gini scores are as high within age groups as they are for the whole distribution. Not surprisingly, the same applies also to wealth-adjusted income, as Table 2 also shows.

Paglin recognised this paradox. Referring to income inequalities, he (1979, p. 676) asked: ‘why, if life cycle effects are important, do cohort Ginis average 90 percent of the overall Gini?’ His answer is that

the cohort Gini measure reveals what lifetime inequality would be if persons within a cohort were fixed in rank order throughout the life cycle of the cohort; hence it always overstates inequality in societies where significant intracohort mobility exists.

The point is equally relevant to wealth inequalities. It can be applied to Piketty’s recent analysis of wealth inequality trends. While recognising that ‘older individuals are certainly richer on average than younger ones’, Piketty (2014, pp. 245–46) nevertheless contended that ‘the concentration of wealth is actually nearly as great

within each age cohort as it is for the population as a whole'. As we can see, this is true of the Australian data, as it is also of the findings elsewhere. Piketty (2014, p. 245) interpreted this evidence as showing that 'Life-cycle saving cannot explain the very highly concentrated ownership of capital that we observe in practice, any more than precautionary saving can'. However, if Paglin is right, the level of intra-cohort inequality is irrelevant to understanding the degree of underlying age-neutral inequality. On Paglin's theory, intra-cohort mobility across the life-cycle accounts for the reductions in inequality relative to the L-Ginis that we see in the age-neutral Ginis shown in Table 3.

Paglin's 1975 article, in which he outlined the Paglin-Gini procedure, 'attracted a record number of adverse comments', as Jenkins and O'Higgins (1989, p. 266) observed, in a paper that offers a general defence of that procedure. Paglin himself replied carefully to each of his critics. Nevertheless, Cowell and van Kerm (2015, pp. 23–24) warned of the risks and limitations in trying to discover underlying inequality levels from cross-sectional data.

In a cross-section, differences in wealth across age do not necessarily reflect movements along individual life-cycles alone, but also secular shifts of the life-cycle patterns across cohorts. So, adjusting inequality for age does not just wipe out differences due to life-cycle positions but also changes in the life-cycle patterns across cohorts. With cross-section data, nothing much can be done to address this.

This seems right. Our analysis has the limitations of any cross-sectional study: it tells us nothing about trends across time, nor about the dynamics of income and wealth, and we have not attempted to examine cohort effects. Accepting these limitations, we

think it is clearly better to have the Paglin and modified-Paglin results than to rely on the usual L-Gini figures, which can easily — but mistakenly — be taken as indicative of underlying inequality.

---

## Conclusion

In an earlier study, we analysed the combined effect of income and wealth on economic inequality in Australia (Tapper and Fenna, 2018). The present study is an attempt to take that one step further, incorporating the age variable, using ABS data for 2009–10. While one might easily assume that incorporating wealth would accentuate inequality, the findings here suggest otherwise: incorporating age has a mitigating effect because of life-cycle patterns. If, as Piketty argued, this is not the case, then inequality is a much more pronounced reality. We posed three substantive questions, which can now be answered, at least for this data set.

- (1) How do income, wealth and wealth-adjusted income change with age (stage in the life cycle)? Equivalent final incomes remain roughly equal across the life cycle. Equivalent net worth rises sharply with age, then tapers off in later life. Equivalent wealth-adjusted income rises until age 60; the rise continues if we use the lifetime annuity method, but with the fixed rate annuity method it falls slightly.
- (2) How do the distribution of income, wealth and wealth-adjusted income change with age (stage in the life cycle)? Equivalent final income inequality rises until mid-life, but then falls markedly. Equivalent net worth inequality is flat until age 50 and falls thereafter. The distribution of equivalent wealth-adjusted final income becomes slightly more unequal up to around age 60, and then becomes very much more equal in the remainder of life if we use the fixed rate annuity method, but stays unchanged across the life cycle if we use the lifetime annuity method.

(3) What is the underlying level of inequality, calculated by controlling for age?

Using the Paglin (P-Gini) or Modified Paglin (MP-Gini) methods of calculation we find that in all cases, inequality is lowered, with the percentage decline being greatest for equivalent net worth and least for equivalent final income. Age-neutral equivalent wealth-adjusted final income is between one-fifth and two-fifths lower than when calculated without age-adjustment. Age-neutral wealth inequality is considerably lower than shown in standard calculations, down by somewhere between 30 per cent and 57 per cent.

The first notable point in these findings is their significance for the Modigliani Life-Cycle Hypothesis. As Modigliani and Japelli observed (2005, p. 141),

The Life-Cycle Hypothesis posits that the main motivation for saving is to accumulate resources for later expenditure and in particular to support consumption at the habitual standard during retirement. According to the model, saving should be positive for households in their working span and negative for the retired ones, and wealth therefore should be hump-shaped.

The present study is silent on savings rates, but it shows clearly that, as we see in Figure 2, the age–wealth profile is far from hump-shaped. In Figure 1, only equivalent disposable income is clearly hump-shaped. Equivalent final income is flat across the life-cycle. The age–wealth profile for wealth-adjusted income continues to rise or falls only slightly in later life. There is a puzzle here why it does not decline in accordance with dictates of the Life-Cycle Hypothesis.

The second key point is more directly connected to public policy concerns. Our results confirm Wolff and Zacharias’s finding that ‘The effect of using wealth-adjusted income instead of money income is to increase the relative wellbeing of



older groups relative to younger ones'. Much Australian public social expenditure, through pensions but more especially through health spending (Tapper, Fenna and Phillimore, 2013; Tapper and Phillimore, 2014; Daley and colleagues, 2014), is directed to the elderly. Yet, as we have seen (Figures 1 and 2), both wealth and wealth-adjusted income are relatively high at the end of life. By a process of upwards redistribution, public social expenditure seems to make the elderly financially better off than the young.

Thirdly, it is notable how low wealth-adjusted income inequality is when age is factored out. Underlying inequality is far lower than is suggested by current standard ('L-Gini') ways of measuring inequality. P-Gini scores are around 0.200; MP-Gini scores are between 0.220 and 0.240. These P-Gini and MP-Gini figures seem especially low when we consider that they incorporate wealth inequality, which taken by itself is always high (Gini = 0.6). To recapitulate, these low figures are arrived at in three steps: by equivalisation of income and wealth data; by integrating equivalised wealth and income figures to produce equivalent wealth-adjusted income; and then by factoring out age.

Yet perhaps these results should not be so surprising. In a life-cycle modelling exercise, Everett and Everett (2015) calculated the Gini coefficients for a society where incomes perfectly follow a single trajectory across life, and savings rates and interest earned are fixed. They (2015, pp. 192–93) found that:

with age as the sole variable among otherwise identical upper-middle-class lives, and with moderate values plugged in for interest rates and the other variables, we derive Ginis for income and wealth in our ideal society that are approximately half those of the current US.

Huggett (1996) reached even stronger conclusions.

In international comparisons, Australia is ranked as middling on income inequality and low on wealth inequality. (See Roine and Waldenström, 2015, pp. 493, 520, 538.) There are no international rankings for wealth-adjusted inequality; nor is there any ranking for underlying or age-neutral inequality. The figures for age-neutral equivalent wealth-adjusted final income presented here may be unique. Given this, the analysis cannot add to our understanding of Australia's relative standing in such comparisons.

Two kinds of further research might be undertaken that would add to this analysis. First, the HILDA survey could be used for a longitudinal wealth-adjusted income study, although on the income side it would count only disposable income and not final income — a significant limitation. Secondly, a study comparing the ABS 2003–04, 2009–10 and 2015–16 fiscal incidence data sets would allow a three-point comparison based on final incomes, and would thus provide an indicator of trends.

---

### Acknowledgments

This paper is part of a research project funded by Australia Research Council Discovery Grant DP140102571: Material Well-Being in the Australian Welfare State and we gratefully acknowledge the ARC's support. We also received help with calculations from Data Analysis Australia. Finally, we particularly acknowledge the valuable criticisms of the reviewers.

---

## References

- Australian Bureau of Statistics 2012, *Government Benefits, Taxes and Household Income, Australia, 2009–10*, Cat. No. 6537.0, ABS, Canberra. Microdata.
- \_\_\_\_\_ 2013a, *Deaths, Australia*, Cat. No. 3302.0, ABS, Canberra.
- \_\_\_\_\_ 2013b, *Household Wealth and Wealth Distribution, Australia 2009–10*, Cat No. 6554.0, ABS, Canberra.
- Actuaries Institute 2015, For Richer For Poorer: Retirement Incomes, viewed December 2018,  
<<https://www.actuaries.asn.au/Library/Opinion/2015/ForRicherForPoorerRetirementIncomes2WEB.pdf>>
- Cowell, F. A. and van Kerm, P. 2015, 'Wealth inequality: a survey', *Journal of Economic Surveys*, vol. 29, no. 4, pp. 671–710.
- Creedy, J. and Tan, L. 2007, 'The relationship between personal income and net worth in Australia', *Australian Economic Review*, vol. 40, pp. 165–81.
- Daley, J., Wood, D., Weidmann, B. and Harrison, C. 2014, *The Wealth of Generations*, Grattan Institute, Melbourne.
- Everett, T. J. and Everett, B. M. 2014, 'Justice and Gini coefficients', *Politics, Philosophy & Economics*, vol. 14, pp. 187–208.
- Formby, J. P. and Seaks, T. G. 1980, 'Paglin's Gini measure of inequality: a modification', *American Economic Review*, vol. 70, pp. 479–482.

- Jenkins, S. and O'Higgins, M. 1989, 'Inequality measurement using "norm incomes": were Garvy and Paglin onto something after all?' *Review of Income and Wealth*, vol. 35, pp. 265–82.
- Headey, B., Marks G. and Wooden, M. 2014, *The Structure and Distribution of Household Wealth in Australia*, Melbourne Institute of Applied Economic and Social Research, Melbourne.
- Headey, B., Warren, D. and Wooden, M. 2008, *The Structure and Distribution of Household Wealth in Australia: Cohort Differences and Retirement Issues*, Social Policy Research Paper No. 33, Melbourne Institute of Applied Economic and Social Research, Melbourne.
- Huggett, M. 1996, 'Wealth distribution in life-cycle economies', *Journal of Monetary Economics*, vol. 38, pp. 469–94.
- Jantti, M., Sierminska, E. and Smeeding, T. 2008, *The Joint Distribution of Household Income and Wealth: Evidence from the Luxembourg Wealth Study*, OECD Social, Employment and Migration Working Papers, No. 65, OECD Publishing.
- Japelli, T. and Modigliani, F. 2005, 'The age saving profile and the life-cycle hypothesis', in F. Modigliani, *The Collected Papers of Franco Modigliani*, pp. 141–72, Cambridge MA, MIT Press, vol 6.
- Klevmarcken, N. A., Lupton, J. P. and Stafford, F. P. 2003, 'Wealth dynamics in the 1980s and 1990s: Sweden and the United States', *Journal of Human Resources*, vol. 38, pp. 322–53.

Organisation for Economic Cooperation and Development 2017, *Preventing Ageing*

*Unequally*, OECD Publishing, Paris, viewed December 2018,

<<http://dx.doi.org/10.1787/9789264279087-en>>

Paglin, M. 1975, 'The measurement and trend of inequality: a basic revision',

*American Economic Review*, vol. 65, 598–609.

\_\_\_\_\_ 1977, 'The measurement and trend of inequality: reply', *American Economic*

*Review*, vol. 67, pp. 520–531.

\_\_\_\_\_ 1989, 'On the measurement and trend of inequality: reply', *American*

*Economic Review*, vol. 79, pp. 265–266.

Piketty, T. 2014, *Capital in the Twenty-First Century*, Harvard University Press,

Cambridge MA.

Roine J. and Waldenström, D. 2015, 'Long-run trends in the distribution of income

and wealth', in *Handbook of Income Distribution* SET vols 2A–2B, A.B.

Atkinson and F. Bourguignon (eds.) pp. 469–592, vol 2, North Holland.

Saunders, P., Bradbury, B. and Wong, M. 2016, 'The growing gap between rich and

poor in Australia', *Australian Journal of Labour Economics*, vol. 19, pp. 15–

32.

Tapper, A., Fenna, A. and Phillimore, J. 2013, 'Age bias in the Australian welfare

state', *Agenda*, vol. 20, pp. 5–20.

Tapper, A. and J. Phillimore, J. 2014, 'Trends in Australian government health

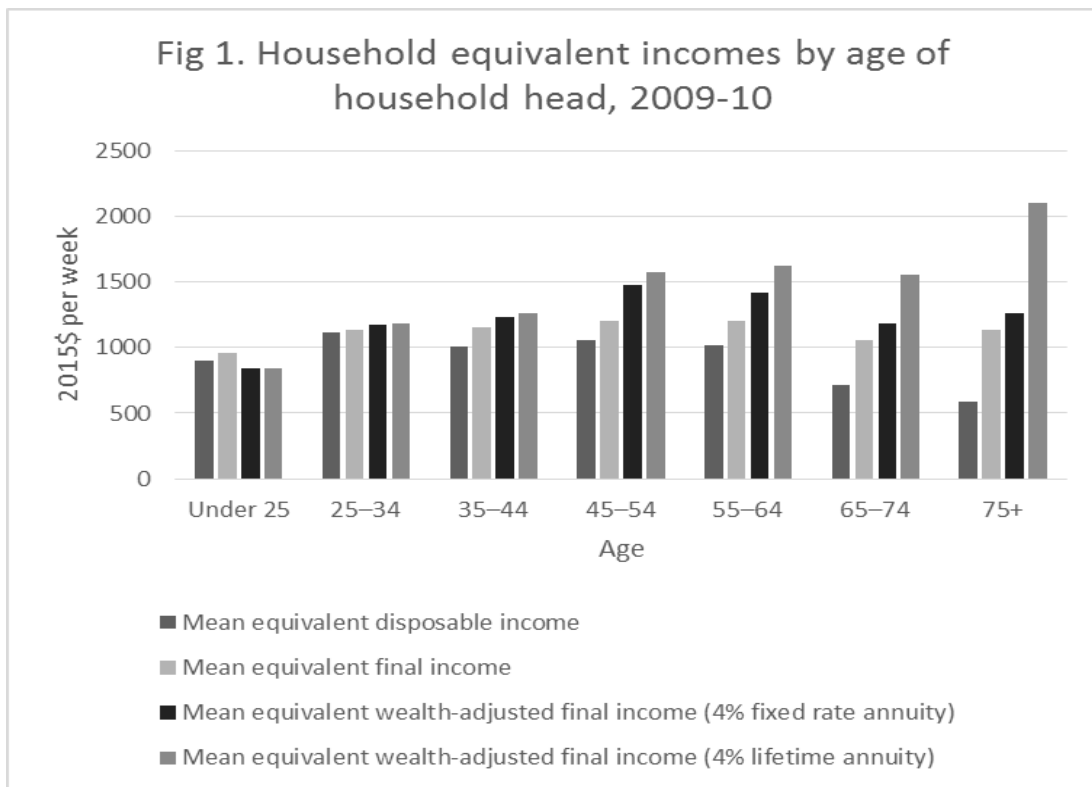
expenditure by age: a fiscal incidence analysis', *Australian Health Review*,

vol. 38, pp. 523–27.

- Tapper, A. and Fenna, A. 2018, 'Income, wealth and economic inequality in Australia', *Australian Journal of Social Issues*, pp. 1–14.
- Travers, P. and Richardson, S. 1993, *Living Decently: Material Well-Being in Australia*, Oxford University Press, Melbourne.
- Taussig, M. K. 1973 *Alternative Measures of the Distribution of Economic Welfare*, Princeton University, Industrial Relations Section Monograph, Princeton, NJ.
- Weisbrod, B. A. and Hansen, W. L. 1968, 'An income–net worth approach to measuring economic welfare', *American Economic Review*, vol. 58, pp. 1315–29.
- Wolff, E. N. and Zacharias, A. 2009, 'Household wealth and the measurement of economic well-being in the United States', *Journal of Economic Inequality*, vol. 7, pp. 83–115.
- Wolfson, M. C. 1979, 'Wealth and the distribution of income, Canada, 1969–1970', *Review of Income and Wealth*, vol. 25, pp. 129–40.

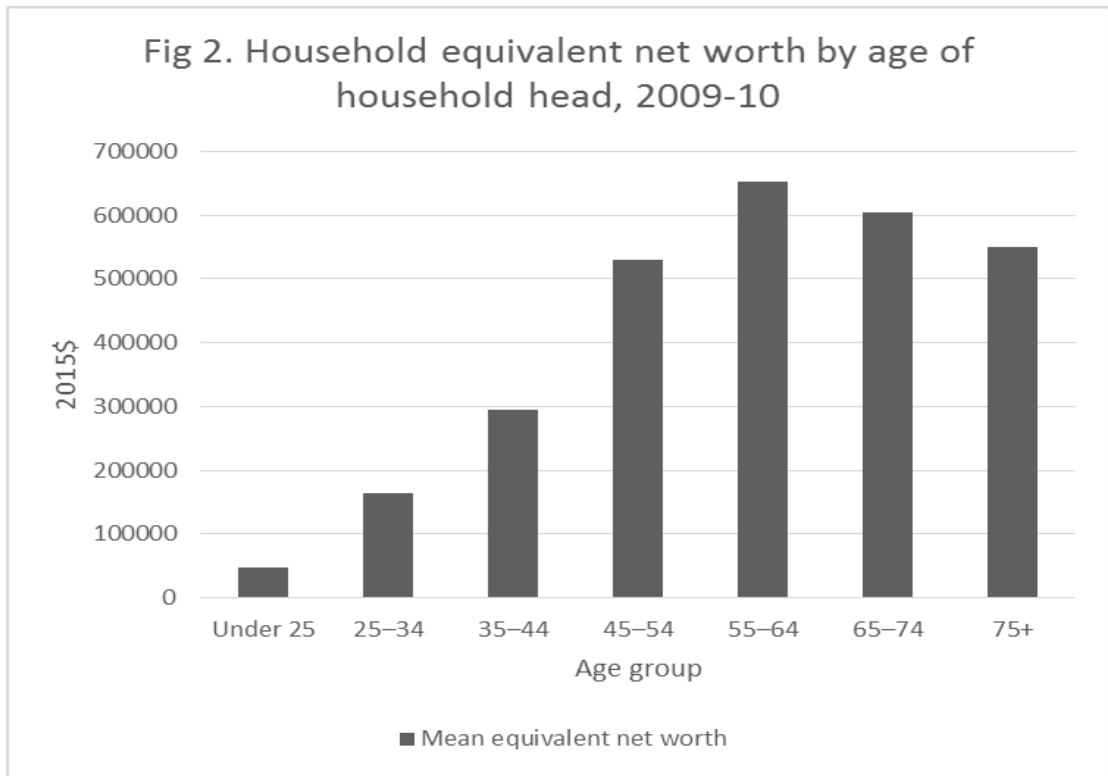
Figures

FIGURE 1: Household equivalent incomes by age of household head, 2009-10



Source: ABS Cat. No. 6537.0 (2012) microdata, and calculations therefrom. Weights applied.

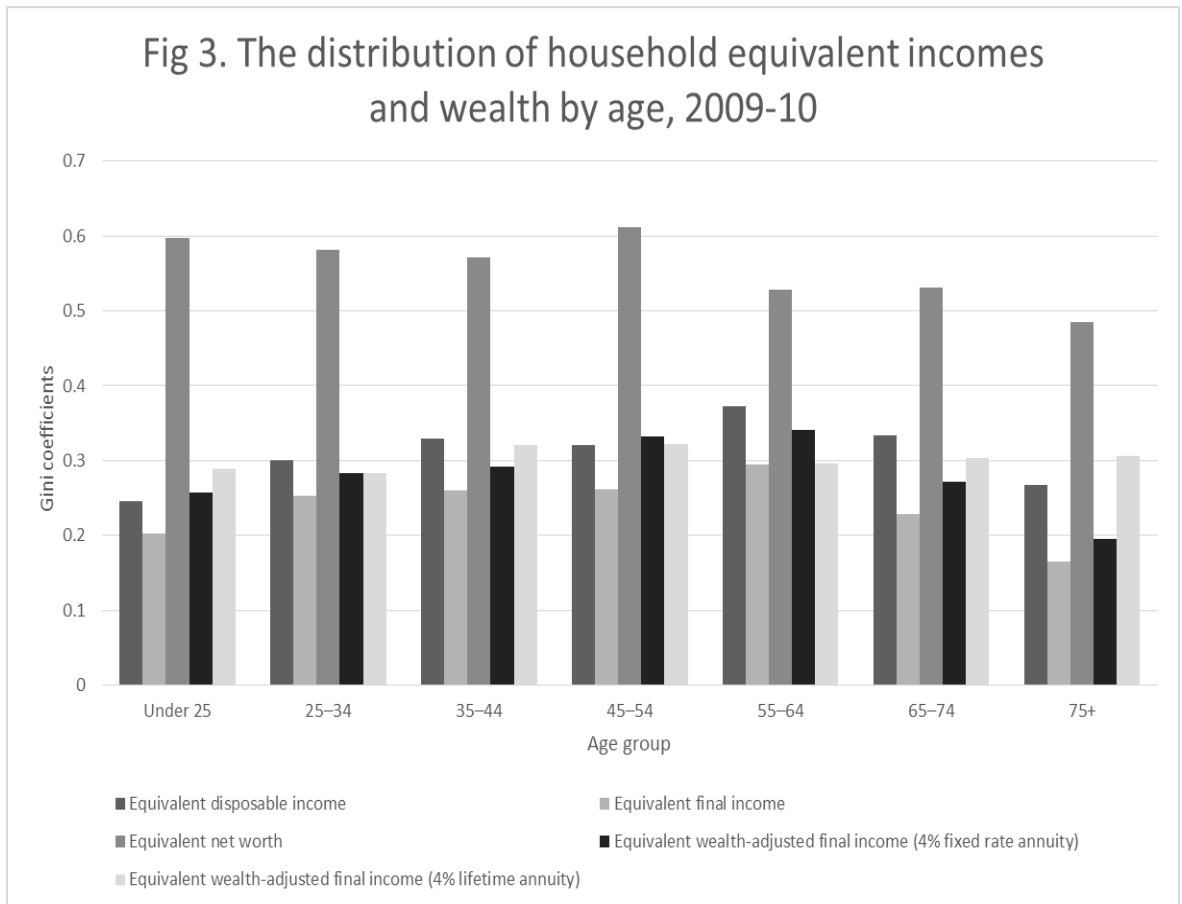
FIGURE 2: Household equivalent net worth by age of household head, 2009-10



Source: ABS Cat. No. 6537.0 (2012) microdata, and calculations therefrom. Weights applied.

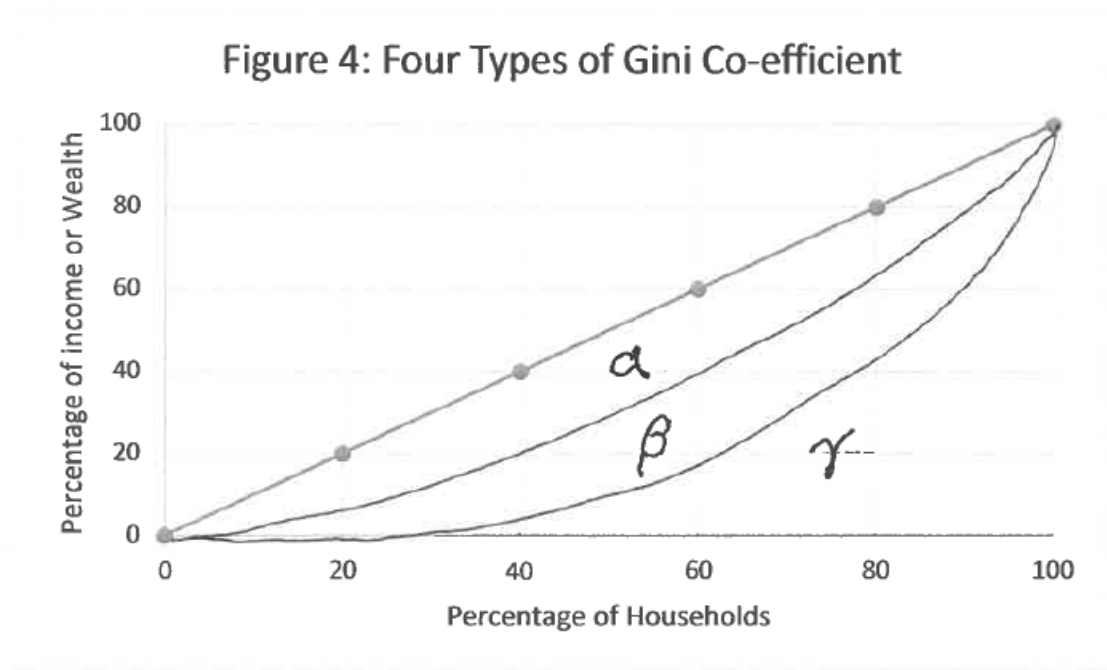


FIGURE 3: The distribution of household equivalent incomes and wealth by age, 2009-10



Source: ABS Cat. No. 6537.0 (2012) microdata, and calculations therefrom. Weights applied. Inequality across persons, rather than households, may be slightly different from the results shown here.

FIGURE 4: Four Types of Gini Co-efficient



Based on Formby and Seaks (1980), Figure 1, p. 480.

Tables

**Table 1: Household equivalent income, equivalent net worth and equivalent wealth-adjusted final income by age of household reference person, Australia, 2009–10 (2015 \$ per week)**

<i>Age of household reference person</i>	<i>Percentage of all households</i>	<i>Mean equivalent disposable income</i>	<i>Mean equivalent final income</i>	<i>Mean equivalent net worth</i>	<i>Mean equivalent wealth-adjusted final income (4% fixed rate annuity)</i>	<i>Mean equivalent wealth-adjusted final income (4% lifetime annuity)</i>
15–24	4.6	902	959	47910	839	840
25–34	16.9	1113	1136	163039	1174	1182
35–44	20.5	1012	1159	294731	1233	1260
45–54	20.4	1054	1203	530071	1480	1574
55–64	17.5	1016	1204	651568	1418	1625

<i>65-74</i>	11.4	710	1056	603993	1184	1555
<i>75+</i>	9.5	584	1132	549869	1257	2107
<i>All ages</i>		803	1150	522135	1287	1398

Source: ABS Cat. No. 6537.0 (2012) microdata, and calculations therefrom. Weights applied.

**Table 2: Distribution of household incomes and wealth by age of household reference person, Australia, 2009–10** Gini coefficients

<i>Age of household reference person</i>	<i>15–</i>	<i>25–</i>	<i>35–</i>	<i>45–</i>	<i>55–</i>	<i>65–</i>	<i>75+</i>	<i>All</i>
	<i>24</i>	<i>34</i>	<i>44</i>	<i>54</i>	<i>64</i>	<i>74</i>		
<i>Equivalent disposable income</i>	0.246	0.300	0.330	0.320	0.372	0.334	0.267	0.331
<i>Equivalent final income</i>	0.203	0.253	0.260	0.261	0.295	0.228	0.165	0.232
<i>Equivalent net worth</i>	0.597	0.581	0.572	0.612	0.528	0.531	0.485	0.583
<i>Net worth</i>	0.605	0.580	0.590	0.605	0.547	0.545	0.496	0.590
<i>Equivalent wealth-adjusted final income (4% fixed rate annuity)</i>	0.257	0.283	0.292	0.332	0.341	0.271	0.195	0.281
<i>Equivalent wealth-adjusted final income (4% lifetime annuity)</i>	0.289	0.283	0.321	0.322	0.296	0.303	0.306	0.314

Source: ABS Cat. No. 6537.0 (2012) microdata, and calculations therefrom. Weights applied. Inequality across persons, rather than households, may be slightly different from the results shown here.

**Table 3: Underlying inequality in income and wealth distributions, Australia, 2009–10** (Gini coefficients)

	<i>Equivalent disposable income</i>	<i>Equivalent final income</i>	<i>Equivalent net worth</i>	<i>Equivalent wealth-adjusted final income (4% fixed rate annuity)</i>	<i>Equivalent wealth-adjusted final income (4% lifetime annuity)</i>
	Ten-year age intervals				
<i>L-Gini</i>	0.331	0.232	0.583	0.281	0.314
<i>Age-Gini</i>	0.107	0.038	0.296	0.083	0.141
<i>P-Gini</i>	0.224	0.194	0.287	0.198	0.173
<i>P-Gini Inequality reduction</i>	32%	17%	51%	29%	45%
<i>MP-Gini</i>	0.251	0.201	0.407	0.216	0.202
<i>MP-Gini Inequality reduction</i>	24%	13%	30%	23%	36%
<i>MP-Gini minus P-Gini</i>	0.027	0.007	0.120	0.018	0.027

Source: ABS Cat. No. 6537.0 (2012) microdata, and calculations therefrom. Weights applied. Inequality across persons, rather than households, may be slightly different from the results shown here.

---

<sup>1</sup> Formby, Seaks and Smith (1989, p. 256) argued that the P-Gini varies with the number of age intervals used to calculate the age-Gini this case. Table 3 shows the results obtained from using ten-year age-intervals. We also calculated P-Ginis and MP-Ginis using five-year age-intervals and found little difference from the ten-year results. The MP-Gini for equivalent wealth-adjusted final income (4% fixed rate annuity) was 0.221 (compared with 0.216); that for equivalent wealth-adjusted final income (4% lifetime annuity) was 0.210 (compared with 0.202).