Chronic and Transitory Poverty over the Life Cycle

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Abstract

This study estimates chronic and transitory rates of poverty in Australia using the concept of permanent income and longitudinal data covering the period July 2001 through June 2007. We sketch a picture of chronic and transitory poverty over the life cycle by decomposing the poverty rate for the entire population into poverty rates for age categories that range from childhood, through adulthood, to old age. The measure of household income that underlies our poverty rates includes imputed rent on owner-occupied, public and rent-free housing, which has a large influence on measured poverty, particularly among older members of the population. We also document changes in chronic and transitory poverty from the period July 2001-June 2004 to the period July 2004-June 2007 and use a jack-knife procedure to test their statistical significance.

JEL Classification: I320; I380; I390

1. Introduction

Conventionally, poverty rates are calculated using a cross section of incomes received in a period no longer than one year, an approach that makes no distinction between chronic and transitory poverty. There is, however, increasing recognition of the need to distinguish between the two types of poverty. Several countries now have longitudinal, unit-record data sets spanning many years and these allow long-term poverty to be identified and measured. The European Union (EU), for example, includes among its primary indicators of poverty and social exclusion the share of persons living in households that are poor in the current year and in at least two of the preceding three years (see, Atkinson, Marlier and Nolan, 2004, p.53). Several EU countries have reported these poverty rates since the mid-1990s (European Commission, 2002, p.193).

        In the academic literature the distinction between short-term and long-term poverty is becoming common, and the two concepts are typically measured by the proportion of people who are poor is a suitably small, or large, proportion of time

periods, respectively (for example, in the Australian context see, Headey, Marks and Wooden, 2005). This 'x-out-of-n times poor' approach implicitly assumes that income received in a given time period can be used for consumption any time within that time period but in that time period alone, an assumption that denies the ability of people to transfer income between periods by saving and borrowing. The permanent income hypothesis (Friedman, 1957), however, suggests that they do just that.

This study estimates chronic (long-term) and transitory (short-term) rates of poverty in Australia based on the concept of permanent income and several years of longitudinal data. We sketch a picture of chronic and transitory poverty over the life cycle by decomposing the poverty rate for the entire population into poverty rates for age categories that range from childhood, through adulthood, to old age. Importantly, and unlike most previous studies of poverty in Australia, the measure of household income that underlies our poverty rates includes imputed rent on owner-occupied, public and rent-free housing. This has a large influence on measured poverty, particularly among older members of the population, many of whom own their home. We also document changes in chronic and transitory poverty from the period July 2001-June 2004 to the period July 2004-June 2007 and use a jack-knife procedure to test the statistical significance of the poverty-rate changes we observe.

The remainder of the paper is organised as follows. Section 2 describes the data on which the study is based and the basic methodology underlying identification of the poor. Section 3 discusses the measure of permanent income that is used to distinguish the chronically poor from those experiencing transitory poverty. Section 4 explains the jack-knife procedure that is used to compute standard errors of poverty rates and poverty-rate changes. The results of the analysis are presented in section 5 and some concluding remarks are offered in section 6.

2. Data and Basic Methodology

The study employs unit-record data from Release 7.0 of the Household, Income and Labour Dynamics in Australia (HILDA) Survey.[1] The HILDA Survey began in 2001 with a complex random sample of 7,682 Australian households containing 19,914 people of various ages. When appropriate weighting procedures are applied, the original sample is representative of people who were living in private dwellings in non-remote areas of Australia in 2001. Data have been collected annually about the original sample members, about children later born to or adopted by them, and about people who later cohabitate and have a child with one of the original members or their descendents. From Wave 2 onwards, information has also been collected about other people living in a household with one of the original sample members or their descendents, but only for as long as they remain in the household.[2]

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[1] The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either FaHCSIA or the MIAESR.

[2] For a discussion of the original HILDA sample, the rules by which individuals are followed and the reference population see Wooden and Watson (2007).

By 2007, almost twelve thousand of the people who were members of the households that participated in Wave 1 were still in the survey. Longitudinal weights provided with the survey data take account of attrition between waves in an attempt to ensure that people in each balanced panel are representative of people who were living in private dwellings in non-remote areas of Australia, from the beginning to the end of the period spanned by the panel (Watson, 2008, pp.86-87).

The results of any analysis inevitably depend on the methodology employed to compute poverty rates. We have adopted several conventions that are commonly used by Australian researchers. First, poverty is identified at the level of the household rather than the family or income unit. Second, each household is classified as poor or non-poor on the basis of its disposable income, rather than its expenditure.[3] Third, the modified OECD equivalence scale is used to adjust each household's annual disposable income for household size and composition. Fourth, all equivalised, annual, disposable incomes have been converted to 2006-07 dollars using the consumer price index. For the sake of brevity, throughout the remainder of the paper we use the term 'equivalised income' to stand for real, equivalised, annual, disposable income unless otherwise stated. Fifth, each household's equivalised income is assigned to all its members and the annual poverty rate is computed as the proportion of people with equivalised incomes less than a given fraction of the median equivalised income of all people. Finally, we have followed the approach of Headey and Warren (2008, p.52) and excluded from our analysis people living in households that have non-positive disposable income or negative private income in one or more years, on the assumption that their income data are unreliable.

Measurement of permanent income, in principle, requires longitudinal data spanning each person's lifetime, or at least a period as long as that over which the person can transfer income by saving and borrowing. Therefore, most of the analysis reported in this paper has been performed using the longest panel that is available at the time of writing. Although seven waves of HILDA data are currently available, only six equivalised, annual income observations can be constructed accurately for each member of the panel. This is because characteristics of the household and its members are recorded as of the time of the annual interview, which in most cases takes place in September or October (Watson, 2009, p.94), but household income data collected at that time pertains to the financial year that ends on the 30th June immediately preceding the interview. Therefore, income extracted from Wave t (t = 2, 3, …7) has been equivalised using household size and structure recorded in Wave t-1. Hence the study covers six financial years starting July 2001 and ending June 2007. Two three-year balanced panels, each containing approximately fourteen thousand people, were used to measure the change in chronic and transitory poverty among resident Australians from the period July 2001-June 2004 to the period July 2004-June 2007.

In one important respect the methodology employed in this paper departs from most other studies: we have added a measure of imputed rent on owner-occupied,

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[3] The measure of household disposable income recorded in the HILDA data set equals household gross income minus household income tax and the Medicare Levy. Gross income is comprised of wages and salaries, business income, investment income, private pensions and transfers, Australian government pensions and benefits, family tax benefits and maternity allowances. Windfall income is excluded from gross income as are transfers in kind, including the Child Care Benefit.

public and rent-free housing to the disposable incomes of the households.[4] This is likely to affect measured poverty because home ownership varies across age groups and is particularly concentrated among the elderly (ABS, 2008a, p.322).We argue that, unlike other durable goods such as cars and home-entertainment centres, shelter fulfils a basic need and therefore investments in owner-occupied housing are similar to investments in income-earning assets. Consider a person who invests $500,000 in financial securities that earn an income of (say) $25,000 per annum. If that person were to use the $500,000 to buy a house instead, no cash payment would be received but a non-cash benefit would be conferred that is conceptually similar to the income earned from the financial securities. From another perspective, a person living in rental accommodation, with an income that is just above the poverty threshold, is not likely to be materially better off than a person living in his or her own home, with an income just below the poverty line. Consistent with these examples, there are two main approaches to measuring imputed rent on owner-occupied housing: as the opportunity cost of the funds invested in the property and as the rent that the owner would have to pay for housing of an equivalent standard.[5] The household imputed rental values included in this study are those contained in the HILDA component of the Cross National Equivalent File (CNEF). Imputed rent on owner-occupied housing is computed as four per cent of the difference between the reported house value and the remaining mortgage principal. Imputed rent for public housing tenants is the difference between rent paid and typical rent for the location. For people living in rent-free accommodation imputed rent is the rent they would need to pay to rent the property (See Lillard *et al*. 2009, pp.2-5).

3. Permanent Income

Traditional measures of poverty implicitly assume that income received in a given year, can be used for consumption any time within that year but cannot be transferred between years. Exceptions are studies by Duncan and Rodgers (1991), Chaudhuri and Ravallion (1994), Mayer (1997) and Hill and Jenkins (2001) who used average income over several years to measure long-term poverty in the US, India, the US and the UK, respectively. Their methodology assumes that both intra-year and inter-year income transfers can be performed at zero cost. In reality, developed countries such as Australia have institutions that facilitate income transfers between time periods, but at market interest rates. People can borrow when young, repay loans and save during middle age, and live off past savings in old age.

Whether saving and borrowing is practised by people at the lower end of the income distribution is an empirical question but there is considerable evidence that they do. Headey and Warren (2008, table 2, p.47), using income and expenditure data from Wave 5 of the HILDA survey, found that expenditure is much more equally

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[4] Households with non-positive disposable incomes and negative private incomes were dropped from the analysis before imputed rent was added to the disposable income.

[5] The United Nations (1977) recommended imputed rent on owner occupied housing be included in household income. Yates (1994) was the first Australian study to implement the UN recommendations. Recent Australian studies that have included imputed rent on owner-occupied housing are Flatau and Wood (2000), Chotikapanich, *et al*. (2003), Saunders and Siminski (2005) and Headey and Warren (2008). The Australian Bureau of Statistics (2008b) has included experimental estimates of imputed rent on owner-occupied dwellings among the variables provided in the second edition of its Survey of Income and Housing 2005-06.

distributed than income. Barrett, Crossley and Worswick (2000, p.117) observed the same phenomenon using data from the ABS' Household Expenditure Surveys (HES) conducted in the 1970s, 1980s and 1990s. Time and again, the ABS itself has reported that for low income people, average weekly household expenditure exceeds average weekly household disposable income (see, for example, ABS, 2008a, p.278). Although this outcome could occur because low-income people misreport their incomes, it is also consistent with saving and borrowing behaviour. Direct evidence about the saving and borrowing behaviour of low-income and high-income people is available from the 'wealth modules' of Waves 2 and 6 of the HILDA survey. Approximately 60 per cent of low-income people report they save, 18 per cent on a regular basis. (Approximately 73 per cent of high-income people save, 25 per cent on a regular basis.) Among low-income people, 62 per cent state that they could use their own savings to access $2,000 and 13 per cent indicate that they would borrow from a financial institution or use credit to raise $2,000. (Approximately 65 per cent of high-income people indicate that they could use their own savings to access $2,000 and 27 per cent indicate that they would borrow from a financial institution or use credit to raise $2,000.)[6] Slesnick (1993) and Mayer and Jencks (1989) provide evidence that many poor people in the United States can and do save and borrow.

Consistent with this evidence, we characterise the chronically poor as people with a deficit of permanent income. Our empirical measure of permanent income is the maximum sustainable annual consumption level that a person could achieve with his or her actual equivalised-income stream over a given number of years, if the person were to save and borrow at prevailing interest rates.[7] For example, people who save in middle age in order to finance consumption in retirement, and people who borrow when young and repay the loan when income increases in adulthood, would be classified as chronically poor if, and only if, their permanent income is below a socially acceptable poverty line. We calculate permanent income using the numerical algorithm described in Rodgers and Rodgers (1993, p.37).[8] The algorithm produces the following as special cases. If equivalised income is constant from year to year then permanent income and equivalised income will be equal. If equivalised income is variable and the same interest rate applies to both saving and borrowing and is constant through time then permanent income is an annuity of equivalent value to the actual equivalised income stream. If interest rates on saving and borrowing are both zero then permanent income is average equivalised income over the time period considered. Each individual is classified as either chronically poor, or not chronically poor, over the entire time period considered according to his or her permanent income.

In our calculations of permanent incomes, the interest rate on savings in each year is the average of the Reserve Bank of Australia's indicator interest rates on cash

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[6] See Rodgers and Rodgers (2009, pp.S39-S41).
[7] Consumption of durables is spread over many time periods so poverty rates based on permanent consumption would probably be lower than those based on annual income. The permanent-income hypothesis states that permanent consumption is proportional to permanent income, not annual income. Permanent income depends on both income-earning assets, including human capital, and non-income earning assets such as home ownership. Our measure of permanent income, which includes imputed housing rentals, is an attempt to approximate permanent consumption.
[8] For simplicity we allow equivalised income to the saved and borrowed. For a household whose composition is unchanged over the planning horizon this is the same as computing permanent income for each household member, aggregating permanent income to the household level then equivalising.

management accounts of balances totalling $10,000 and $50,000 and the interest rate on term deposits of six and twelve months. The rates varied between 3.0 per cent and 4.1 per cent during the financial years 2000-01 through 2006-07. The interest rate on borrowings was calculated as the average of the standard credit card interest rate and the RBA indicator lending rates for fixed and variable rates on unsecured term loans. These rates ranged from 13.5 per cent to 14.5 per cent during the seven-year period.[9]

 Rodgers and Rodgers (1993) used an absolute poverty line in their calculations of chronic, transitory and average-annual poverty in the United States. In this paper we modify their procedure to incorporate a relative poverty line. Following convention, we identify people in annual poverty by comparing their equivalised incomes in a given year with a poverty line equal to a given proportion of the median equivalised income of all people in that same year. The conceptual choice of a relative-poverty line based on permanent income (that is, a chronic-poverty line) is less obvious. One possibility is to compute each person's permanent equivalised income, find the median and set the poverty line equal to a given proportion (say, 50 per cent) of that median. The problem with this procedure is that it is possible that someone who is not poor in any year could be classified as chronically poor and someone who is poor in every year could be classified as not chronically poor. This is demonstrated using two hypothetical examples below. The incomes of five people, median income of the group and a poverty line equal to 50 per cent of median income are observed in each of three time periods. For simplicity, each person's permanent income is calculated as a simple average of his or her income levels in the three years. In Example A, Person 1's income exceeds the poverty line of 22.5 in all three years but her permanent income of 24 is less than half the median permanent income of the group, namely 26. In Example B, Person 1's income is below the poverty line of 30 in every year but his permanent income of 29 is greater than half the median permanent income of the group, namely 28.5.

Example A: Person 1 is not poor in any time period

Year	Person 1	Person 2	Person 3	Person 4	Person 5	Median income	Poverty line
1	23	45	52	44	70	45	22.5
2	24	45	52	80	42	45	22.5
3	25	45	52	44	62	45	22.5
permanent income	24	45	52	56	58	52	26

Example B: Person 1 is poor in every time period

Year	Person 1	Person 2	Person 3	Person 4	Person 5	Median income	Poverty line
1	29	50	65	60	70	60	30
2	29	62	45	60	63	60	30
3	29	50	61	60	65	60	30
permanent income	29	54	57	60	66	57	28.5

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[9] RBA F04 Retail Deposit and Investment Rates and RBA F05 Indicator Lending Rates are available at http://www.rba.gov.au/Statistics/Bulletin/index.html.

The procedure used in this paper avoids the inconsistencies demonstrated in these two examples. The relative chronic-poverty line is set equal to the permanent equivalised income of someone who earns a given percentage (say, 50 per cent) of the median, equivalised income in each year. Thus, someone who is on the poverty line in every year will also be on the chronic-poverty line. Someone who is above the poverty line in one or more years and never below it will be classified as not in chronic poverty. This occurs in Example A, where the chronic-poverty line used in this paper would be 22.5. Someone who is below the poverty line in one or more years and never above it will necessarily be classified as chronically poor. This occurs in Example B, where the chronic-poverty line we advocate would be 30.

When the head-count ratio is used to construct a poverty index for an entire population, average annual poverty in a balanced panel of n people over T time periods is a simple average of the poverty rates in all time periods. This average-annual-poverty index is decomposed into a chronic component, which is the proportion of people in the balanced panel who are in chronic poverty, and a transitory component, which is the residual.[10]

4. Standard Errors of Poverty Rates and Poverty-rate Changes

The HILDA data constitute a complex, rather than a simple, random sample of people living in households in all but very remote areas of Australia. Standard errors of the poverty rates can be computed using a jackknife methodology (see ABS, 2007, pp.27-29). The process entails computing each poverty rate 45 times using the 45 sets of replicate weights provided as part of the HILDA data and measuring the variability of these multiple estimates around the poverty rate calculated using the 'main' weight. Thus, standard errors of poverty rates calculated using a given balanced panel are computed as follows:

$$\mathrm{SE}(\hat{p}) = \sqrt{\frac{44}{45} \sum_{j=1}^{45} (\hat{p}_j - \hat{p})^2} \tag{1}$$

where $\hat{p}$ is the poverty rate (average-annual, chronic or transitory) computed using the full panel and the corresponding longitudinal 'main' weight; $\hat{p}_j$ is the poverty rate computed from the sub-sample of the panel that is obtained when the jth set of longitudinal replicate weights are used. The relative poverty line used in computing the poverty rate for each of the random sub-samples must be recalculated for each of the 45 random sub-samples.

To compute the standard error of a poverty-rate change from one sequence of time periods to another it is necessary to take account of the fact that many of the same people will be present in both balanced panels and consequently the panels are not independent samples. The standard error of a poverty-rate change from one balanced panel to another is calculated as:

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[10] The index used to measure poverty at the aggregate level need not be the simple, crude head-count ratio. Rodgers and Rodgers (1993) used a number of 'gap' indices, which take account of the extent to which poor peoples' incomes fall short of the poverty line.

$$\text{SE}(\hat{p}_2 - \hat{p}_1) = \sqrt{\frac{44}{45} \sum_{j=1}^{45} [(\hat{p}_{2j} - \hat{p}_{1j}) - (\hat{p}_2 - \hat{p}_1)]^2}$$

where $\hat{p}_i$ $(i = 1, 2)$ is the poverty rate computed using the ith full panel and its longitudinal 'main' weight; $\hat{p}_{ij}$ $(i = 1, 2; j = 1, 2, \ldots 45)$ is the poverty rate computed from the sub-sample that is obtained when the ith panel's j^{th} set of longitudinal replicate weights are used. Once again, the relative poverty line used in computing the poverty rate for each of the random sub-samples from a particular panel must be recalculated for each of the 45 random sub-samples.

5. Results

The Effect of Income Transfers on Poverty Rates

Table 1 reports estimated poverty rates for the population living in Australia throughout the period 2001 through 2007. The table shows how increasing the length of the income period affects estimates of chronic, transitory and average-annual relative-poverty rates. In section A of the table, household income includes imputed rent on owner-occupied, public and rent-free housing; in section B imputed rent is excluded from household income. In both sections, the income period is increased in five one-financial-year increments starting with the 2006-07 financial year and ending with the period 1 July 2001 to 30 June 2007. The chronic-poverty line decreases as the length of the income period increases because median equivalised income has risen over the time period considered.

Table 1 - Permanent-Income Poverty Rates, Measured over Different Periods

Income period	Chronic poverty line ($)	Chronic poverty	Transitory poverty	Average annual poverty	Chronic ÷ av annual poverty
A. Household income includes household imputed rental values					
July 06 - June 07	20,556			11.0	
July 05 - June 07	20,076	9.1	1.5	10.6	85.7
July 04 - June 07	19,704	8.0	2.7	10.7	74.9
July 03 - June 07	19,285	7.4	3.1	10.5	70.3
July 02 - June 07	18,818	6.7	3.8	10.5	63.9
July 01 - June 07	18,377	6.2	4.3	10.5	59.6
B. Household income excludes household imputed rental values					
July 06 - June 07	17,515			14.4	
July 05 - June 07	17,121	11.6	2.3	14.0	83.2
July 04 - June 07	16,844	11.2	2.9	14.1	79.3
July 03 - June 07	16,476	10.2	3.7	13.9	73.5
July 02 - June 07	16,103	9.5	4.4	13.9	68.4
July 01 - June 07	15,800	8.7	5.1	13.8	63.4

Source: HILDA, Release 7.0 and CNEF-HILDA7
Notes: Author's computations based on the 2001-07 balanced panel of enumerated persons and longitudinal enumerated person weights. Poverty lines are in 2006-07 dollars

First consider section A of table 1. As income transfers are permitted over more and more years, the rate of chronic poverty decreases by 2.9 percentage points from 9.1 per cent to 6.2 per cent. Average-annual poverty, which is computed using a separate relative-poverty line for each year, remains approximately constant at 10.5 per cent because annual relative-poverty rates have been approximately constant over the time period. Consequently, transitory poverty, which is the difference between the average-annual and chronic rates of poverty, increases from 1.5 per cent to 4.3 per cent as the length of the income period increases. The rate of chronic poverty, expressed as a percentage of the average-annual poverty rate, decreases from 85.7 to 59.6. Now consider section B. The poverty lines are lower when household income does not include imputed rent on owner-occupied, public and rent-free housing but the relative-poverty rates are as much as 3.4 percentage points higher than those in section A. Nevertheless, whether imputed rent is included or not, the rate of chronic poverty declines as income transfers are permitted over longer time periods, the average-annual poverty rate is approximately constant and therefore the rate of transitory poverty increases.[11]

It might be argued that the declining rate of chronic poverty observed in table 1 could be caused by an age effect rather than by the ability to smooth income over successively longer periods. Each time the income period is extended, a new year of data is added in which all individuals in the balanced panel are one year younger. If there is no age effect, the rate of chronic poverty should also decline as the length of the income period is increased by one-year increments from the financial year 2001-02 to the period July 2001-June 2007 and all individuals are a year older. Appendix 1 confirms there is no age effect: as the income period is extended forward the rate of chronic poverty decreases, despite concurrent increases in the chronic poverty line.

The Effect of Imputed Housing Rentals on the Chronic-poverty Rate

Intuitively, one would expect poverty rates to be lower when the income measure includes imputed housing rentals than when it excludes them. If the value of the poverty line is unchanged, this is certainly true. If a relative poverty line is employed, however, the inclusion of imputed rent will increase median, equivalised income and it is possible that the accompanying increase in the value of the relative poverty line will lead to an increase in the rate of relative poverty. In less extreme cases, the reduction in poverty rates may be smaller than expected.

It is evident from sections A and B of table 1 that including imputed housing rentals as part of equivalised, disposable income has reduced poverty rates. The extent to which the reduction in the rate of chronic poverty over the period July 2001 through June 2007 is influenced by the change in the income measure used to reflect household resources and by the resulting change in the monetary value of the relative poverty line is depicted in figure 1. Two poverty-rate profiles are displayed in the figure, one of which graphs the chronic-poverty rate, based on equivalised income excluding imputed housing rentals, as a function of the poverty line in monetary terms. The other is a graph of equivalised income including imputed housing rentals, as a function of the poverty line.[12] The vertical line on the left in figure 1 is positioned at the 50 per cent

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[11] Rodgers and Rodgers (1993) using US data, observed a decrease in the proportion of poverty that was chronic as the income period was increased, but after ten years the ratio stabilized. With only seven waves of HILDA data, table 1 shows the proportion of poverty that is chronic to be still declining.
[12] For a discussion and alternative use of poverty-rate profiles, see Rodgers, Siminski and Bishop (2009).

chronic-poverty line based on equalised income, excluding imputed housing rentals; the vertical line on the right is drawn at the 50 per cent chronic-poverty line based on equalised income, including imputed rent. When imputed rent is excluded from income the value of the relative poverty line is $15,800 and 8.7 per cent of people are chronically poor. When income includes imputed rent the relative poverty line is equal in value to $18,377 and the percentage of people in chronic poverty is 6.2. However, at a poverty line anchored on $15,800, only 2.5 per cent of people are chronically poor. That is, the total effect of imputed rent is to reduce the chronic-poverty rate by 2.5 percentage points (from 8.7 to 6.2 per cent), because the 6.2 percentage-point fall in chronic poverty (from 8.7 to 2.5 per cent) when the poverty line is anchored on $15,800 is largely offset by a 3.7 percentage-point increase (from 2.5 to 6.2 per cent) resulting from the higher value of the relative poverty line.

Figure 1 - Chronic Poverty-Rate Profiles, The Effect of Including and Excluding Imputed Rent
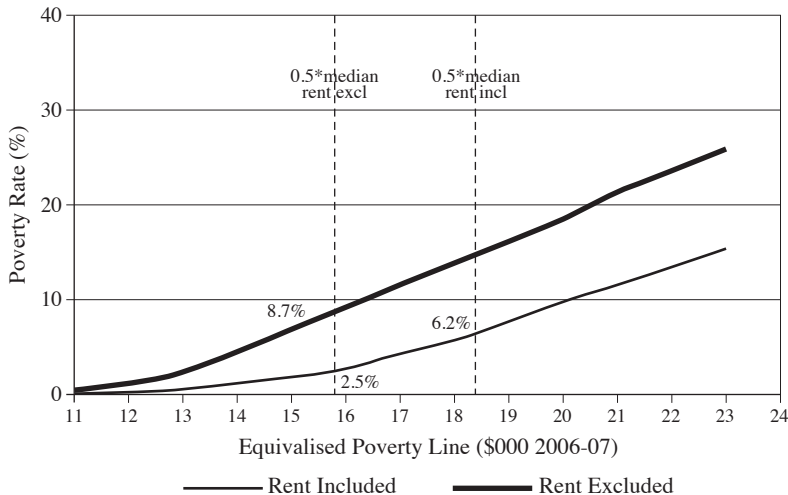
Source: HILDA Release 7.0 and CREF_HILDA7
Notes: Author's computations based on persons present in HILDA households in all waves Longitudinal enumerated person weights were used. Imputed housing rentals included.

Chronic and Transitory Poverty by Age Group

Table 2 decomposes estimates of average-annual, chronic and transitory poverty for the population who are present in Australia from 2001 through 2007, into five mutually exclusive and collectively exhaustive age groups that span the life cycle.

- Dependent children are individuals who, in all years of the panel, are either (a) younger than 15 years or (b) aged 15-24 years, not employed full-time, studying full-time, living with at least one parent, and without a partner or child of their own. When appropriately weighted, dependent children comprise 20 per cent of the population.

- Adults are people who, throughout the panel, are aged 25-64 years or are aged 15-24 but are not dependent children. Adults make up 58 per cent of the population.
- Elderly people are individuals who are aged 65 and older in all years. Ten per cent of the population are elderly.
- The child-to-adult category consists of people who are dependent children at the beginning of the panel and are adults at the end. These people make up eight per cent of the population.
- The adult-to-elderly category consists of people who are adults in some of the years and are elderly in other years. Four per cent of the population are in this category.

Interest is focussed on dependent children and elderly people as these are the groups that have least control over their economic circumstances.

Table 2 - Permanent-Income Poverty, July 2001-June 2007, Decomposed by Age

	Dependent Children	Child-to-adult	Adults	Adult-to-elderly	Elderly Persons	All Persons
A. Household income includes household imputed rental values						
Chronic poverty	6.4	7.0	5.1	9.8	10.5	6.2
Chronic-poverty intensity	1.0	1.1	0.8	1.6	1.7	1.0
Transitory poverty	4.5	10.8	3.4	3.8	3.5	4.2
Transitory-poverty intensity	1.1	2.6	0.8	0.9	0.8	1.0
Average-annual poverty	11.0	17.8	8.5	13.6	14.0	10.5
Average-annual poverty intensity	1.1	1.7	0.8	1.3	1.3	1.0
B. Household income excludes household imputed rental values						
Chronic poverty	5.3	5.4	4.9	21.8	33.5	8.7
Chronic-poverty intensity	0.6	0.6	0.6	2.5	3.8	1.0
Transitory poverty	4.8	11.0	4.6	6.5	2.9	5.0
Transitory-poverty intensity	1.0	2.2	0.9	1.3	0.6	1.0
Average-annual poverty	10.2	16.4	9.5	28.3	36.4	13.8
Average-annual poverty intensity	0.7	1.2	0.7	2.1	2.6	1.0
Sample size	2,715	824	6,563	540	1,150	11,792

Source: HILDA, Release 7.0 and CNEF-HILDA7
Notes: Author's computations based on the 2001-07 balanced panel of enumerated persons and longitudinal enumerated person weights. Poverty lines are $18,377 (imputed rent included) and $15,800 (imputed rent excluded)

First, consider section A of table 2 where imputed housing rents are included in household income. Chronic-poverty rates are highest for the elderly (10.5 per cent) and those approaching old age (9.8 per cent). The poverty-intensity indices (Rodgers and Rodgers, 1991), which equal the poverty rate for the age group divided by the poverty rate for the whole population, emphasise the disparities across the age groups. Chronic poverty among adults is only 0.8 times as intense as chronic poverty in the entire population, whereas chronic poverty among the elderly and those approaching old age is 1.7 and 1.6 times as intense, respectively, as that of the population as a whole. The chronic-poverty rates for dependent children and for those approaching adulthood

are 1.0 and 1.1 times as large, respectively, as the chronic-poverty rate for all persons.

The profile of transitory poverty across the age groups is quite different. Transitory poverty is highest for young people moving into adulthood, for whom it is 10.8 per cent, that is, 2.6 times as large as transitory poverty in the entire population. Transitory-poverty rates for adults, the elderly and those approaching old age are slightly lower than that of the entire population; the transitory poverty for children is slightly higher.

Average-annual poverty rates have a different age-group profile, being much lower for adults (8.5 per cent) than for any of the other four groups. Average-annual poverty is highest among those moving into adulthood (17.8 per cent) but is also high among the elderly (14.0 per cent) and people entering old age (13.6 per cent). Children have an average-annual poverty rate of 11.0 per cent, which is higher than that of adults but approximately the same as the poverty rate for the entire population.

A comparison of sections A and B of table 2, reveals that including imputed housing rental values in household income has different effects on the poverty rates for the different age groups. Home-ownership is most common among older people, so, it is not surprising that imputed housing rent has its largest impact on their poverty rates. Both chronic and average-annual poverty rates for the elderly and those approaching old age, are two-to-three times larger when imputed housing rentals are not treated as part of income, even though the value of the relative poverty line is $15,800 rather than $18,377. To a large extent these results are explained by the level of the age pension. Mid 2007, the maximum single age pension was set at (525.1 x 26 =) $13,653 per year and the maximum age pension for couples was (2 x 438.50 x 26 =) $22,802 per year, which equivalises to $15,201 (Centrelink, 2007). Thus, those reliant entirely on the age pension would be classified as in long-term poverty.

However, children and those entering adulthood have chronic and average-annual poverty rates that are lower when imputed rent is excluded from household income than when it is included.[13] The average-annual poverty rate for adults is one percentage point higher, but their chronic-poverty rate is little affected when imputed housing rent is not taken into account.

In summary, table 2 shows that the elderly are the most chronically poor, followed by those moving into old age, whether imputed housing rentals are included in household income or not. These people have few assets other than their homes. Our analysis of data from the wealth module of HILDA's Wave 6 indicates that on average the elderly have non-home, non-financial assets of $66,019 per person; those approaching old age are somewhat better off with $140,316. However, 50 per cent of the elderly have no more than $6,000 in such assets and 50 per cent of the adult-to-elderly group have no more than $12,000. Furthermore, their superannuation savings are meagre: the average per person for the elderly is $30,574 but 50 per cent have no superannuation holdings at all; the average per person for the adult-to-elderly is $96,642 but 50 per cent have no more than $10,000 per person.

Sensitivity Analysis of Chronic Poverty by Age Group

Table 3 tests the sensitivity of the results in table 2 to alternative chronic-poverty lines and to alternative methods of measuring chronic poverty. In addition to chronic-

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[13] This somewhat counter-intuitive outcome occurs because the exclusion of imputed housing rentals reduces not only the income measure but also the value of the relative poverty line.

poverty rates based upon permanent income (see section A), estimates are given in section B of long-term poverty computed using the common 'x-out-of-n times poor' method and the method employed by the European Union as a measure of social exclusion (poor in the 2006-07 financial year and at least two of the previous three years).[14] We also computed poverty rates using a simple average of equivalised incomes over the six years. A poverty line equal to 50 per cent of the median equivalised income is used with the alternative methodologies. All poverty rates in table 3 have been calculated with imputed rent on owner-occupied, public and rent-free housing included in household income.

Table 3 - Sensitivity Analysis of Long-Term Poverty to the Poverty Index, Decomposed by Age

	Dependent Children	Child-to-adult	Adults	Adult-to-elderly	Elderly Persons	All Persons
A. Chronic-poverty rates (%)						
Poverty line = 40% median income	1.6	2.0	1.3	1.4	2.2	1.5
Chronic-poverty intensity	1.0	1.3	0.9	0.9	1.5	1.0
Poverty line = 50% median income	6.4	7.0	5.1	9.8	10.5	6.2
Chronic-poverty intensity	1.0	1.1	0.8	1.6	1.7	1.0
Poverty line = 60% median income	16.7	15.7	9.7	19.2	24.1	13.5
Chronic-poverty intensity	1.2	1.2	0.7	1.4	1.8	1.0
Poverty line = 70% median income	26.0	24.9	15.9	29.8	40.3	21.7
Chronic-poverty intensity	1.2	1.1	0.7	1.4	1.9	1.0
B. Other rates of persistent poverty (%), poverty line = 50% median income						
Poor in all 6 years (%)	1.2	0.7	0.9	4.2	2.7	1.3
Poverty intensity	0.9	0.5	0.7	3.2	2.1	1.0
Poor in ≥ 5 years (%)	3.2	2.4	2.6	5.9	4.8	3.1
Poverty intensity	1.0	0.8	0.8	1.9	1.6	1.0
Poor in ≥ 4 years (%)	6.3	5.7	4.5	7.1	9.3	5.6
Poverty intensity	1.1	1.0	0.8	1.7	1.6	1.0
Poor in 2007 & ≥ 2 of prev 3 yrs (%)	4.6	6.3	3.8	8.5	8.4	4.9
Poverty intensity	1.0	1.3	0.8	1.8	1.7	1.0
Average-income poverty rate (%)	7.3	7.7	5.4	9.2	11.1	7.0
Poverty intensity	1.0	1.0	0.8	1.5	1.6	1.0
Sample size	2,715	824	6,563	540	1,150	11,792

Source: HILDA, Release 7.0 and CNEF-HILDA7
Notes: Author's computations based on the 2001-07 balanced panel of enumerated persons and longitudinal enumerated person weights. Poverty rates were calculated with household imputed rental values included in household income

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[14] Some people prefer the 'x-out-of-n times poor' method because they argue that financial market constraints make borrowing infeasible for some, if not all, people on low incomes. For such people the permanent-income poverty rates presented in this paper can be regarded as a best case scenario.

Based on their permanent incomes, the elderly, and to a lesser extent those approaching old age, are the most chronically poor at all four chronic-poverty lines considered in section A of table 3. As the chronic-poverty line is increased from 40 per cent to 70 per cent, chronic poverty among the elderly increases from 2.2 per cent (1.5 times that of the entire population) to 40.3 per cent (1.9 times that of the entire population). On the other hand, adults are the least chronically poor group, with poverty rates rising from 1.3 to 15.9 per cent as the poverty line increases but always remaining below that of the whole population. Dependent children and people approaching adulthood have similar chronic-poverty rates, which are between 1.0 and 1.3 times that of the population as a whole, at the poverty lines considered.

The results in section B of table 3 indicate that approximately 1.3 per cent of the entire population was poor in all six financial years. Among people in the three youngest age groups, the six-year poverty rates were slightly lower. However, people in the two oldest age groups experienced higher six-year poverty rates: 2.7 per cent of the elderly and 4.2 per cent of those approaching old age were poor in all six years. The (at least) 'x-out-of-n times poverty' rate for each age group necessarily increases as x decreases, but the poverty rate for those approaching old age is generally highest followed by the poverty rate for the elderly. This result, contrasted with the opposite ranking of these two groups according to chronic poverty, indicates that those approaching old age are better able to transfer income between years than are the elderly.

Approximately 4.9 per cent of the whole population was poor in 2006-07 and at least two of the previous three financial years, the EU's concept of long-term poverty. The largest poverty rates occur among the elderly (8.4 per cent) and among those moving into old age (8.5 per cent). These are 1.7 and 1.8 times as large, respectively, as the poverty rate of the population as a whole. In comparison, the poverty rate for adults (3.8 per cent) is only 0.8 times as large as that of the entire population. The two younger groups fall between the two extremes and are 1.0 and 1.3 times poorer than the population as a whole.

The average-income poverty rates also show the elderly and those approaching old age to be the poorest, and adults to be the least poor, long term. Although the average-income poverty rate for all groups, except the adult-to-elderly, is higher than the corresponding chronic-poverty rate (at a poverty line equal to 50 per cent of median income), the two methods lead to similar poverty intensities.

Sensitivity Analysis of Chronic Poverty to the Equivalence Scale

The modified OECD equivalence scale that underlies the results in tables 1, 2 and 3 assigns one point to the first adult in the household, 0.5 points to each additional adult and 0.3 points to each child less than 15 years old. An alternative equivalence scale would produce different poverty rates but the direction of change is theoretically ambiguous because both equivalised incomes and the relative poverty line, which is based upon median equivalised income, will change in the same direction. Table 4 investigates the sensitivity of the results in section A of table 3 to two alternative equivalence scales. The first is the square-root scale where the number of adult equivalents in a household equals the square root of the number of people in the household. The second is the (old) OECD equivalence scale, which assigns one point

to the first adult in the household, 0.7 points to each additional adult and 0.5 points to each child less than 15 years old. The (old) OECD equivalence scale was used by EUROSTAT until the mid 1990s before switching to the modified OECD scale. The square-root scale is common in research today, including more recent publications of the OECD. For most household structures the square-root scale produces fewer adult equivalents and higher equivalised household incomes than the modified OECD scale. The (old) OECD scale produces the opposite result: more adult equivalents and lower equivalised household incomes than the modified OECD scale, particularly for households containing children. Consequently, median equivalised incomes in this study are: square-root scale ($40,022), modified OECD scale ($36,754) and (old) OECD scale (30,233). Section A of table 4 displays poverty rates computed using the square-root scale. Poverty rates based upon the (old) OECD scale are displayed in section B of table 4.

Table 4 - Sensitivity Analysis of Chronic Poverty Rates to the Equivalence Scale, Decomposed by Age

	Dependent Children	Child-to-adult	Adults	Adult-to-elderly	Elderly Persons	All Persons
A. Poverty rates based on the square-root equivalence scale						
Poverty line = 40% median income	2.2	1.3	1.7	2.5	3.3	2.0
Chronic-poverty intensity	1.1	0.6	0.9	1.2	1.7	1.0
Poverty line = 50% median income	8.7	6.7	5.8	10.7	14.0	7.5
Chronic-poverty intensity	1.1	0.9	0.8	1.4	1.9	1.0
Poverty line = 60% median income	17.5	14.8	10.2	21.3	28.6	14.4
Chronic-poverty intensity	1.2	1.0	0.7	1.5	2.0	1.0
Poverty line = 70% median income	27.5	23.2	16.8	31.6	43.9	22.9
Chronic-poverty intensity	1.2	1.0	0.7	1.4	1.9	1.0
B. Poverty rates based on the OECD equivalence scale						
Poverty line = 40% median income	2.6	2.1	1.0	0.1	0.1	1.3
Chronic-poverty intensity	2.1	1.7	0.8	0.1	0.1	1.0
Poverty line = 50% median income	9.9	7.9	4.8	5.4	3.9	6.0
Chronic-poverty intensity	1.7	1.3	0.8	0.9	0.7	1.0
Poverty line = 60% median income	20.0	15.6	9.5	14.1	16.0	12.9
Chronic-poverty intensity	1.5	1.2	0.7	1.1	1.2	1.0
Poverty line = 70% median income	31.1	23.9	15.4	23.4	29.6	21.0
Chronic-poverty intensity	1.5	1.1	0.7	1.1	1.4	1.0
Sample size	2.6	2.1	1.0	0.1	0.1	1.3

Source: HILDA, Release 7.0 and CNEF-HILDA7
Notes: Author's computations based on the 2001-07 balanced panel of enumerated persons and longitudinal enumerated person weights. All poverty rates were calculated with household imputed rental values included in household income. Median equivalised income is $30,233 (OECD scale) and $40,022 (square-root scale).

Compared with the modified OECD equivalence scale, the square-root equivalence scale leads to higher chronic-poverty rates for all age categories except the 'child-to-adult' group. However, at the poverty lines considered, the chronic-poverty intensity indices and the ranking of the age categories by chronic poverty are approximately the same as when the modified OECD scale is used: the elderly are the poorest, followed by those approaching old age, dependent children, people approaching adulthood and adults, in that order. The (old) OECD equivalence scale produces different outcomes to those produced by the modified OECD scale. The old scale gives more weight to children and this is probably why poverty rates for children are higher and poverty rates for the elderly and those approaching old age are lower at all poverty lines. Indeed, under the (old) OECD scale children constitute the poorest group at all poverty lines considered in table 4. The ranking of the other four age groups varies according to the poverty line employed.

Changes in Chronic and Transitory Poverty Rates over Time

Table 5 investigates changes in chronic, transitory and average-annual poverty since the beginning of the new millennium. Estimated poverty rates for the population that was present in Australia throughout the period July 2001 through June 2004 are compared with those of the population present in Australia from July 2004 to June 2007. All poverty rates in table 5 have been computed using household incomes that include imputed rent on owner-occupied, public and rent-free housing and are decomposed by age. Poverty-rate changes from the earlier, to the later, three years, together with their standard errors, are presented so that the statistical significance of each poverty-rate change can be determined.

Table 5 - Changes in Permanent-Income Poverty, July 2001-June 2004 to July 2004-June 2007, Decomposed by Age

	Dependent Children	Child-to-adult	Adults	Adult-to-elderly	Elderly Persons	All Persons
Chronic, July 04 - June 07	8.0	12.3	5.9	12.5	12.4	7.5
Chronic, July 01 - June 04	7.9	12.0	6.0	10.3	9.1	7.1
Δ in chronic poverty	0.1	0.3	-0.1	2.2	3.3*	0.4
SE of Δ in chronic poverty	1.5	2.8	0.7	5.6	1.9	0.8
Transitory, July 04 - June 07	3.2	7.3	2.5	1.0	1.7	2.7
Transitory, July 01 - June 04	3.5	7.2	2.8	4.0	3.9	3.3
Δ in transitory poverty	-0.3	0.1	-0.3	-3.0	-2.2	-0.6
SE of Δ in transitory poverty	3.1	3.6	1.6	6.5	10.5	0.6
Av-annual, July 04 - June 07	11.2	19.5	8.4	13.5	14.1	10.2
Av-annual, July 01 - June 04	11.3	19.2	8.9	14.3	13.1	10.4
Δ in av-annual poverty	-0.1	0.3	-0.5	-0.8	1.0	-0.2
SE of Δ in av-annual poverty	2.1	3.2	1.9	9.3	10.4	0.4
Sample size, 2005-07	3,491	470	7,898	254	1,549	13,662
Sample size, 2001-03	3,707	443	8,027	228	1,459	13,684

Source: HILDA, Release 7.0 and CNEF-HILDA7.
Notes: Author's computations based on the 2001-03 and 2005-07 balanced panels of enumerated persons and their accompanying longitudinal enumerated person weights. Poverty lines are $19,344 (2005-07) and $17,300 (2001-03).
* indicates significant at the 10 per cent level.

Table 5 presents a picture of static poverty. All but one of the poverty-rate changes are small and not significantly different from zero, statistically speaking. The exception is the increase of 3.3 percentage points in chronic poverty of elderly persons, which, with a P-value of 0.0912, is statistically significant at the ten per cent level. The results in table 5 are largely exploratory because the time period spanned by each panel is so short. However, as successive waves of longitudinal data become available changes in chronic and transitory poverty are likely to display some interesting features.

6. Summary and Conclusions

This paper has presented rates of chronic poverty that are in the spirit of the permanent-income hypothesis and theories of life-cycle consumption and savings behaviour in that we allow individuals to transfer income between years by saving and borrowing at market interest rates. Based on longitudinal data and a measure of income that includes imputed rent on owner-occupied, public and rent-free housing, we find the average annual poverty rate in the population that was resident in Australia from 2001 through 2007 to be 10.5 per cent, of which 6.2 per cent is chronic poverty and 4.3 per cent is transitory poverty. The effect of including imputed housing rentals in equivalised household income is considerable. When it is excluded the rates of chronic, transitory and average-annual poverty are 8.7, 5.1 and 13.8 per cent, respectively.

A decomposition of our chronic, transitory and average-annual poverty rates by age provides a 'quasi' life-cycle profile of poverty. We find that the rate of chronic poverty is particularly high for the elderly (10.5 per cent) and for people approaching old age (9.8 per cent). While the average-annual poverty experienced by people moving into adulthood is high (17.8 per cent), most of it is transitory in nature; only seven per cent of these people are chronically poor. The impact of including imputed rent on owner-occupied, public and rent-free housing is particularly large for the elderly whose chronic and average-annual poverty rates more than double when household imputed rental values are not taken into account. Our finding that the elderly experience the highest rates of chronic poverty is robust with respect to where the poverty line is set and it continues to hold when several alternative methods are used to measure long-term poverty. The finding is, however, sensitive to the choice of an equivalence scale that assigns a large weight to children. Under the (old) OECD equivalence scale, which was in common usage until the mid 1990s, chronic poverty was found to be highest for children at relative poverty lines equal to 40, 50, 60 and 70 per cent of median, equivalised income. Poverty among children has received considerable attention in recent research (for example, Bradbury, 2003), and has important policy implications given children's vulnerability and the possible long-term consequences of an impoverished childhood. However, even under the old OECD equivalence scale the elderly were almost as chronically poor as children at a relative poverty line equal to 70 per cent of median income, which is equivalent to a little less than $22,000 annually.

We found no statistically significant changes over time in the rates of chronic, transitory or average-annual poverty of the population as a whole, or of any of the age groups – with one exception. A marginally significant increase of 3.3 percentage points in chronic poverty of the elderly was observed. The static nature of poverty is not surprising given that the data span only six financial years, and cover a period of

uninterrupted prosperity in the Australian economy. If the analysis were to be repeated in a few years time, when data incorporating the effects of the global financial crisis become available, inter-temporal changes in chronic and transitory poverty rates may well be different.

Given Australia's ageing population, our finding that people aged 65 and older have rates of chronic poverty that are 1.7 times as large as that of the population as a whole – even after adding imputed housing rentals to disposable income – has significant policy implications. These people have few opportunities to improve their own material well being via labour-market activities. Aside from their home they have few non-financial assets, and most have meagre superannuation savings. The implication is that if chronic, relative poverty is to be reduced among the elderly income support measures, particularly the age pension, will play an important role.

Appendix A1
Permanent-Income Poverty Rates, Measured over Different Periods

Income period	Chronic poverty line ($)	Chronic poverty	Transitory poverty	Average annual poverty	Chronic ÷ av annual poverty
A. Household income includes household imputed rental values					
July 01 - June 02	16,858			10.2	
July 01 - June 03	17,140	7.9	2.6	10.5	75.2
July 01 - June 04	17,482	7.0	3.3	10.3	68.1
July 01 - June 05	17,810	6.5	3.9	10.4	62.9
July 01 - June 06	18,090	6.6	3.8	10.4	63.4
July 01 - June 07	18,377	6.2	4.3	10.5	59.6
B. Household income excludes household imputed rental values					
July 01 - June 02	14,755			13.3	
July 01 - June 03	14,877	11.3	2.3	13.6	83.0
July 01 - June 04	15,095	10.1	3.4	13.5	74.8
July 01 - June 05	15,358	9.6	4.1	13.7	70.0
July 01 - June 06	15,573	9.3	4.4	13.6	68.0
July 01 - June 07	15,800	8.7	5.1	13.8	63.4

Source: HILDA, Release 7.0 and CNEF-HILDA7
Notes: Author's computations based on the 2001-07 balanced panel of enumerated persons and longitudinal enumerated person weights. Poverty lines are in 2006-07 dollars.

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