Poverty And Income Inequality Measurement: Accommodating A Role For Owner-Occupied Housing

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ISSN: 1440-5059
ISBN: 0-8690558312

December 2002

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Journal of Economic Literature Classifications: I32, D63.

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I Introduction

The most common method used in Australia to identify whether an income unit is in poverty is to compare the income unit’s disposable cash income with a cash income-based poverty line adapted to each income unit’s needs. If disposable cash income lies below the poverty threshold then the income unit is deemed to be in poverty. This approach was adopted in the Commission of Inquiry into Poverty (Henderson, 1975) and in numerous subsequent pieces of poverty-related research in Australia. The role of housing is incorporated in the standard method in terms of housing cost effects, comparisons being made between the income units’ disposable cash income, before and after its housing cost outlays have been deducted, from similarly defined before and after housing cost poverty line benchmarks (see Bradbury, Rossiter and Vipond, 1986; Bradbury, Doyle and Whiteford, 1993; and also Newman and Struyk, 1983, and Johnson and Webb, 1992 for the United States and the United Kingdom respectively). The after-housing cost poverty line is equal to the poverty line less standard housing costs; the latter is some notional outlay sufficient to acquire housing of a minimum satisfactory standard.

An emphasis on housing costs in the measurement of poverty reflects the importance of housing outlays to the household’s budget. But there are other reasons for measuring the incidence of poverty on a before and after-housing cost basis. The variation in housing costs by locality, can mean that an income which may be sufficient to escape poverty in one locality, is inadequate in another. Measurement of poverty on a before- and after-housing cost basis can also shed light on the widespread belief that homeownership is instrumental in the prevention of after-housing cost poverty, particularly in old age (Bradbury, Rossiter and Vipond, 1986). Finally, intervention by governments to assist home owners and renters results in variation in the per unit cost of housing by dwelling, household type, income and stage in the life cycle (Johnson and Webb, 1992, p. 287). The extent to which these variations alleviate the housing affordability problems of the poor, and protect low income households from poverty is an important issue deserving attention.

The before- and after-housing cost poverty line approach, however, has been criticised on a number of grounds including most obviously that the cash definition of income adopted is an inadequate measure of well-being. Defining income on a cash basis means that implicit rents from owner occupied housing are ignored (as are all other non-cash forms of income). This can lead to results which are intuitively unappealing. Consider the case of the renter with the same disposable cash income and equivalent housing outlays as the owner-occupier. On a disposable cash income basis, these two income units are in the same position relative to the before- and after-housing cost poverty line. But the equity holdings of the home owner can, in principle, be realised to smooth out fluctuations in income (Atkinson, 1987). The home owner is then less vulnerable to poverty than is the renter.

Researchers who have sought to measure the relative economic well-being of the elderly, have addressed this issue by converting household net worth into an annuity (Hurd, 1990; Burkhauser, Butler and Wilkinson, 1985; Hurd and Shoven, 1985; Rendall and Speare, 1993). This is also the preferred approach in some recent studies of the distribution of income (Lerman and Lerman, 1986; Yates, 1994). It is assumed in these studies that the annuity is paid out like a bond coupon, so that the capital value of net housing worth remains unchanged. The gross income stream from the annuity being added to the cash income of the income unit. In Flatau and Wood (2000), we termed the sum of the annuity income and the disposable cash income of the unit gross comprehensive income but argued that this measure of income may overstate the economic well-being of home owners. It does so because it ignores the fact that, in general, housing equity can only produce an income stream if the housing equity is realised. There are potentially a significant cost involved in the conversion of net housing worth. The financial disadvantages involved in home equity conversion include both the transaction costs of home equity conversion and the adverse tax-transfer impacts arising from the ‘privileged’ position owner-occupied housing equity has in the Australian tax system and in terms of

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income support payments. Home owners receiving government income support assistance may, for example, incur a loss of benefit or pension entitlement when wealth is converted to a non-owner occupier form and produces a stream of cash income. In Flatau and Wood (2000), we developed a net comprehensive income measure which accounts for the financial disadvantages of owner equity conversion on the household’s well-being. A case study simulation revealed that owner occupier income units in receipt of government income support payments and with low to moderate levels of housing equity faced relatively high marginal effective tax rates on equity realisation. However, marginal effective tax rates differed markedly between ‘pensioners’ (e.g., age pensioners) and ‘beneficiaries’ (e.g., NewStart allowance recipients) with the consequence that the benefits of home equity conversion in terms of post-realisation income differed significantly between the various income support categories.

The purpose of the present paper is to extend Flatau and Wood (2000) in three important ways. First, we extend the methodological framework by taking into account post-housing equity conversion housing costs for the owner occupier. This enables us to measure after-housing cost net comprehensive income and determine the incidence of before- and after-housing cost poverty. Second, we estimates rates of poverty and determine the degree of income inequality in Australia across all income unit types on the basis of survey data (rather than adopting the case study simulation approach in our previous work). Estimates of net comprehensive income rely on the availability of personal and income unit income broken down by income source together with information on the housing circumstances of the income unit. This information is available in the Australian Bureau of Statistics (ABS) Survey of Income and Housing Costs (SIHC) Confidentialised Unit Record File (CURF) and we use the 1997-98 SIHC CURF in this paper which represents the latest release of this dataset (ABS, 1999a). Using this dataset we arrive at estimates of net comprehensive income for Australian income units and use these measures to estimate the incidence of before- and after-housing cost poverty on the basis of this measure for all Australian income units. Finally, we extend the analysis beyond the simple head-count poverty measure which was used in Flatau and Wood (2000) and into a broader range of income inequality and poverty measures – namely, the Foster poverty measures (Foster, et al., 1984) and the Gini inequality measure – and, on the basis of these measures, compare poverty rates and the degree of inequality in the distribution of income on a cash basis and a net comprehensive income basis. The key question that this paper poses in this context is: Does the net comprehensive measure of income result in a significantly different picture of income inequality and poverty for Australia? This question is answered via the utilisation of a formal hypothesis testing framework.

In section 2 of the paper, we develop a conceptual framework for defining increases in home owners’ consumption opportunities upon conversion of net housing worth. Section 3 describes the method by which we estimate net comprehensive income in the Australian case. In section 4, we present estimates of poverty and income inequality among Australian home owners using the 1997-98 SIHC CURF on a before and after-housing cost basis using cash and net comprehensive income measures.

II Conceptual Framework

The net comprehensive income approach is based on measurement of the maximum potential sustainable consumption levels that can be attained by home owners, on conversion of net housing worth by sale of their dwellings. We refer to this method of measuring economic well-being as the net comprehensive income approach to emphasise the point that, in the absence of reverse mortgage options, it is only net comprehensive income from sale of home owners equity net of all tax and transfer effects which can be drawn on to increase the income units’ future consumption possibilities.

An income unit’s economic well-being is taken to be given by the maximum constant real consumption expenditure \((x)\) that can be financed at any point in time \(t = 0, 1, 2 \ldots, T\), where \(T\) is the income unit’s consumption horizon. Consider an income unit with constant real earnings \((y)\) and a constant real interest income \((ya)\) from financial assets \((Ai)\) with an average real yield equal to \(r\), which is also assumed to be equal to the real discount rate. The real capital value of financial assets is unchanged to time period \(T\). The income unit owns physical assets \(Ao\) at time \(t=0\) from which
complete dis-saving is allowed over the consumption horizon. The constraint which must be met over
the consumption horizon is given by,
\[
\int_{t=0}^{T} xe^{-rt} dt = \int_{t=0}^{T} ye^{-rt} dt + \int_{t=0}^{T} y^{r} e^{-rt} dt + A_{o} + A_{i} e^{-rT},
\]
where \( y^{r} = rA_{i} \). Integration of equation (1) and solving for \( x \) yields,
\[
x = y + \frac{rA_{i}}{(1-e^{-rT})} + \frac{rA_{o}}{(1-e^{-rT})},
\]
which is an income-net worth measure of economic well-being, in which the second and third
terms on the right hand side of equation (2) are annuity streams from financial and physical assets
(Weisbrod and Hansen, 1968). In order to operationalise the income-net worth measure values must
be estimated for the consumption horizon \( T \) and, in more sophisticated versions, mortality rates
(Burkhauser et al., 1985). These complications are avoided if we assume an infinite consumption
horizon. Equation (2) reduces to
\[
x = y + rA_{i} + rA_{o},
\]
which is the comprehensive income measure where annuities are paid out like a bond coupon,
and which is commonly employed in studies of income inequality, poverty and the relative economic
status of the elderly. An important feature of both the income-net worth and comprehensive income
measures is that physical assets and financial assets are converted into income flows using the same
annuity formula. Assets are then perfectly substitutable, so that a given net worth will make the same
contribution to \( x \) no matter what the composition of net worth. A second and related feature is that tax
impacts and eligibility for government assistance are ignored.

Now let us consider the mechanisms which enable income units to convert physical assets
into income flows, and the tax and government benefit consequences. We assume realization of \( A_{o} \) at
market values and investment of the capital sum (net of transaction costs) in financial assets with an
average real yield equal to \( r \). The variable \( y \) is now replaced by \( y^{b} \) which is defined as the sum of
constant real earnings and the (assumed) constant real government benefit entitlements when income
is zero. On conversion of physical assets into an income flow by means of realization at market value,
the value of \( x \) can be found from the consumption horizon constraint:
\[
\int_{t=0}^{T} xe^{-rt} dt = \int_{t=0}^{T} (1-m)(y^{b} + y^{r}) e^{-rt} dt + A_{i} e^{-rT} + (1-c)A_{o} e^{-rT},
\]
where
\[
y^{Q} = r(A_{i} + [1-c]A_{o}).
\]
The parameter \( m \) is the average effective tax rate which represents the proportion of real
income foregone due to tax payments and withdrawal of government benefit entitlements. The
transaction cost parameter \( c \) is the proportion of realised capital sums absorbed by selling costs. With
a finite consumption horizon we obtain
\[
x = (1-m)y^{b} + \frac{(1-m)y^{r}}{1-e^{-rT}}.
\]
If an infinite consumption horizon is assumed equation (6) reduces to
\[
x = (1-m)y^{b} + (1-m)y^{Q}
\]
We refer to equation (7) as a net comprehensive income measure of economic well-being. It
has the virtue of explicitly addressing the issue of how income units convert physical assets into an
income flow in order to increase consumption potential. In the present context, conversion is by
means of asset realization, and the researcher is able to explore the disadvantages of such an imposed
consumption strategy. The following section explains the methodology employed in the computation
of comprehensive and realised income measures of economic well-being in the Australian case.
Those owners who have realised their housing equity need to rent housing services following conversion of net housing worth.\textsuperscript{3} The after-housing cost position of home owners, is then measured by deducting an imputed rent payment which would be made in the private rental market, following conversion of net housing worth.\textsuperscript{4} We assume that the income unit rents a dwelling of equivalent market value to their current dwelling.

\textit{III Measurement and data}

Measurement of net comprehensive income begins by assuming that the owner occupier income unit sells the house and invests the proceeds of the housing equity net of selling costs in an annuity. We follow Apps (1992) and adopt the convention of assuming that resources, and thus housing equity, are shared equally between members of the income unit. The 1997-98 SIHC, which is used as the basis of measuring net comprehensive income in this study, includes owner-occupier estimates of the current sale value of their dwelling together with details of mortgages held. This enables the determination of owner occupied housing equity.

Studies of housing costs generally ignore the contribution of selling costs.\textsuperscript{5} In this paper, we have made use of recommended maximum commission schedules observed by members of the Real Estate Institute of Australia relevant to the date of the survey data used in the study. These commission schedules were formerly determined by each State branch of the Real Estate Institute of Australia.\textsuperscript{6} They are comprised of a series of marginal percentage rates applicable to sales value ranges. The marginal rate declines with increases in the sale value (see Wood, 1996, appendix 1). Despite the deregulation in real estate markets, these schedules provide a useful benchmark against which we can assess selling costs.

The annuity chosen for the study is one with a 100 per cent residual capital value. Such an annuity preserves the capital value of the realised housing equity and is consistent with the infinite lifetime assumption adopted adopted in the previous section.\textsuperscript{7} To allow for sensitivity our results we compare estimates of income inequality and poverty assuming that the income stream derived from the annuity is equal to 5 per cent of the realised housing equity and compare our results with those obtained under a lower rate of return (2 per cent).

Once the value of the annuity and its income stream has been determined, we need to assess how owner occupier housing equity conversion impacts on the level and form of government income support received by individuals in the 1997-98 SIHC. Owner occupied housing equity is not assessable under Australian income and assets tests. Once the housing equity is realised, however, both the income derived from the annuity and the value of the annuity itself is assessed under relevant income and assets tests. This means that entitlement to income support may fall or indeed cease on realisation of housing equity. To determine the level of government income support available to the income unit in the post-housing realisation position, we apply income and assets tests to the income and assets of the individual inclusive of the assessable income and asset of the annuity. As income and assets tests differ according to the various categories of income support payment, we assess each income support payment made to individuals in the 1997-98 SIHC separately.

The new level of individual (taxable) government income support entitlement is added to the existing private cash income of the individual for the purpose of calculating income tax liabilities, tax deductions, and tax rebates. The Australian income tax system is based on individual incomes so that each individual in an income unit can face a different marginal tax rate. In calculating the tax liabilities of couples contingent on realisation, the income earned on alternative investments of housing equity is split evenly between the partners (see also Bourassa and Hendershott, 1993). The 1996-97 tax schedules are applied to gross income net of imputed deductions to arrive at gross tax liabilities.\textsuperscript{8} Net tax payable is found by subtracting tax rebates and then adding the Medicare Levy. Rebates for spouse and child dependents, sole parents, pensioners and beneficiaries have been computed for this purpose. The Medicare Levy is based on taxable income but there are thresholds below which the Medicare Levy is zero and in the case of couples, this is based on their combined income. Details regarding the Medicare Levy, rebates and tax schedules relevant to this study are presented in Flatau and Wood (2000).

The need to rent housing services following conversion of net housing worth into an income generating investment asset, means that we must subtract an estimated rent payment to arrive at after-
housing cost income. This imputed rent payment is obtained by applying estimated private rent-to-
values ratios to the owner-occupier’s estimated value of the housing. These private rent-to-value
ratios were estimated using a contemporaneous ABS survey of private rental investors; namely, the
1997 Rental Investors Survey (ABS, 1999b). This survey contains rental investor estimates of the
market value of dwellings rented and the rent paid on the dwelling. The approach adopted aims to
ensure that owner occupiers, post-housing realisation, are paying a rent in the private market on a
dwelling equivalent to that which they are living in as owner-occupiers. Under 1996-97 rent
assistance provisions, pensioners and beneficiaries receive rent assistance provided rent payments
exceed a specified threshold. Such rent assistance cuts out when private income reaches specified
thresholds. Rent payments net of rent assistance payments have been computed where relevant.

Estimates of the incidence of poverty on a before and after-housing cost basis require poverty
line benchmarks defined on a before and after-housing cost basis. The most commonly invoked
benchmarks in Australia are the Henderson poverty lines (Henderson, 1975). These are cash based
budget standards developed by the Commission of Inquiry into Poverty in 1975, and updated
quarterly by reference to movements in per capita household disposable income (see Saunders, 1994).
The most well known early Australian study of the incidence of poverty on a before and after-housing
cost basis employed the Henderson poverty lines (Bradbury, Rossiter and Vipond, 1986); to facilitate
comparison with the results of this study, we also employ the Henderson poverty lines on a before and
after-housing cost basis.

III Results

An adaptable poverty measure is the Forster class of poverty measures, $P_\alpha$ defined as:

$$P_\alpha = \frac{1}{N} \sum_{z_i \leq z} \left( \frac{z_i - y_i}{z_i} \right)^\alpha$$

where $z_i$ denotes the poverty line relevant to a given income unit and $\alpha$ is a non-negative
parameter. Higher values of $\alpha$ indicate greater sensitivity of the poverty measure to inequality among
the poor. In this paper, we consider $\alpha = 0$ and $2$. When $\alpha = 0$, the poverty measure, $P_0$, is equal to
the commonly used head-count ratio or the proportion of people in poverty. Let $\mu_p$ be the mean
income of those in poverty. When $\alpha = 1$, $P_1 = P_0 I$ where $I = 1 - \mu_p / y_p$. The measure $P_1$ depends
on both the proportion of people in poverty and the extent to which, on average, those people fall
below the poverty line. When $\alpha = 2$ it can be shown that $P_2$ takes into account the proportion of
people in poverty, the extent to which those people fall below the poverty line and the inequality of
income of those in poverty. The $P_2$ measure of poverty satisfies both Sen’s (1976) monotonicity
axiom that the reduction of the income of a poor individual must increase the rate of poverty and his
transfer axiom that a transfer of income from a poor individual to a richer individual must increase the
poverty rate while the head count measure satisfies neither axiom. Despite these serious deficiencies
the head count measure is easily understood and is commonly used and for this reason much of the
presentation of the results will focus on head count poverty estimates for Australia.

<p>| Foster poverty measures, all income units and owner occupier income units, Australia, 1996-97 |
|-----------------------------------------------|---------------------------------|-----------------|-----------------|-----------------|
| Income measure and rate of return assumption  | Poverty measure                 | Owner occupiers  |                 |                 |                 |
|                                               | $P_0$ Head count measure of poverty | All income units | All owner occupiers | Owners with a mortgage | Owners without a mortgage |
| 5 per cent return CDI                         | 0.2565                          | 0.1747           | 0.1033           | 0.2295           |</p>
<table>
<thead>
<tr>
<th></th>
<th>CDI</th>
<th>NCI</th>
<th>CDI (HC)</th>
<th>NCI (HC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 per cent return</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCI</td>
<td>0.2107</td>
<td>0.9694</td>
<td>0.0818</td>
<td>0.1876</td>
</tr>
<tr>
<td></td>
<td>(0.0045)</td>
<td>(0.0043)</td>
<td>(0.0060)</td>
<td>(0.0059)</td>
</tr>
<tr>
<td>NCI (HC)</td>
<td>0.1896</td>
<td>0.1724</td>
<td>0.1029</td>
<td>0.2259</td>
</tr>
<tr>
<td></td>
<td>(0.0043)</td>
<td>(0.0041)</td>
<td>(0.0033)</td>
<td>(0.0046)</td>
</tr>
<tr>
<td>5 per cent return</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDI</td>
<td>0.0558</td>
<td>0.0289</td>
<td>0.0177</td>
<td>0.0376</td>
</tr>
<tr>
<td></td>
<td>(0.0021)</td>
<td>(0.0015)</td>
<td>(0.0012)</td>
<td>(0.0017)</td>
</tr>
<tr>
<td>NCI</td>
<td>0.0450</td>
<td>0.0104</td>
<td>0.0123</td>
<td>0.0089</td>
</tr>
<tr>
<td></td>
<td>(0.0019)</td>
<td>(0.0011)</td>
<td>(0.0020)</td>
<td>(0.0013)</td>
</tr>
<tr>
<td>CDI (HC)</td>
<td>0.0595</td>
<td>0.0363</td>
<td>0.0410</td>
<td>0.0326</td>
</tr>
<tr>
<td></td>
<td>(0.0023)</td>
<td>(0.0018)</td>
<td>(0.0019)</td>
<td>(0.0018)</td>
</tr>
<tr>
<td>NCI (HC)</td>
<td>0.0647</td>
<td>0.0454</td>
<td>0.0317</td>
<td>0.0559</td>
</tr>
<tr>
<td></td>
<td>(0.0024)</td>
<td>(0.0021)</td>
<td>(0.0017)</td>
<td>(0.0023)</td>
</tr>
<tr>
<td>2 per cent return</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCI</td>
<td>0.0491</td>
<td>0.0174</td>
<td>0.0150</td>
<td>0.0192</td>
</tr>
<tr>
<td></td>
<td>(0.0019)</td>
<td>(0.0014)</td>
<td>(0.0022)</td>
<td>(0.0019)</td>
</tr>
<tr>
<td>NCI (HC)</td>
<td>0.0860</td>
<td>0.0819</td>
<td>0.0422</td>
<td>0.1124</td>
</tr>
<tr>
<td></td>
<td>(0.0028)</td>
<td>(0.0027)</td>
<td>(0.0020)</td>
<td>(0.0032)</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations based on the 1997-98 Survey of Income and Housing Costs Confidentialised Unit Record File. The annual 1996-97 incomes from this file are used for estimation purposes.

Legend: CDI: Cash disposable income, NCI: Net comprehensive income. HC refers to housing costs and the resulting estimate of poverty is an after-housing cost measure of poverty. All remaining estimates of poverty are before-housing cost estimates. In the case of the NCI measure, owner occupier housing costs are the notional rental costs on equivalent housing, while for renters, housing costs are actual housing costs.

Note. Estimates of poverty are provided for two scenarios. A 5 per cent rate of return (paid on a 100 per cent residual capital value annuity) and a 2 per cent rate of return. In the case of the cash disposable income measure, there is no difference in incomes between different rates of return and hence no difference in rates of poverty between the two different rates of return. Standard errors are in brackets.
TABLE 2  
Head-count poverty rates, all income units and owner occupier income units, Australia, 1996-97

<table>
<thead>
<tr>
<th>Income unit type</th>
<th>Cash before housing costs</th>
<th>Net before housing costs</th>
<th>Cash after housing costs</th>
<th>Net after housing costs</th>
<th>Owner without a mortgage</th>
<th>Owner with a mortgage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Couple with dependent children</td>
<td>16.2</td>
<td>11.9</td>
<td>12.0</td>
<td>12.3</td>
<td>25.2</td>
<td>52.9</td>
</tr>
<tr>
<td>Couple without dependent children</td>
<td>11.7</td>
<td>6.6</td>
<td>9.2</td>
<td>7.8</td>
<td>57.6</td>
<td>25.0</td>
</tr>
<tr>
<td>One parent</td>
<td>43.1</td>
<td>38.0</td>
<td>24.7</td>
<td>25.2</td>
<td>13.4</td>
<td>23.5</td>
</tr>
<tr>
<td>One person</td>
<td>36.3</td>
<td>27.3</td>
<td>17.9</td>
<td>16.8</td>
<td>25.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Sex of the reference person</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>20.8</td>
<td>15.7</td>
<td>13.1</td>
<td>12.6</td>
<td>34.1</td>
<td>30.5</td>
</tr>
<tr>
<td>Female</td>
<td>37.7</td>
<td>27.4</td>
<td>18.5</td>
<td>17.5</td>
<td>29.3</td>
<td>11.7</td>
</tr>
<tr>
<td>Labour force status of the reference person</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed full time</td>
<td>12.8</td>
<td>10.8</td>
<td>10.3</td>
<td>10.1</td>
<td>22.1</td>
<td>39.3</td>
</tr>
<tr>
<td>Employed part time</td>
<td>39.1</td>
<td>32.1</td>
<td>26.9</td>
<td>26.3</td>
<td>26.6</td>
<td>17.6</td>
</tr>
<tr>
<td>Unemployed</td>
<td>55.3</td>
<td>50.7</td>
<td>30.8</td>
<td>31.8</td>
<td>12.1</td>
<td>11.7</td>
</tr>
<tr>
<td>Not in the labour force</td>
<td>38.3</td>
<td>23.9</td>
<td>16.1</td>
<td>14.3</td>
<td>55.3</td>
<td>6.0</td>
</tr>
<tr>
<td>Total</td>
<td>25.6</td>
<td>19.0</td>
<td>14.7</td>
<td>14.0</td>
<td>32.7</td>
<td>25.1</td>
</tr>
</tbody>
</table>
Figure 1 Housing tenure and age, 1997-98 SIHC

Figure 2 Head-count poverty rates by age, 1996-97, 5 per cent rate of return, 1997-98 SIHC
The most commonly used measure of poverty in Australia is the before-housing head count poverty rate based on the Henderson poverty line and accompanying equivalence scales using a cash disposable income (CDI) measure. The Australian head count poverty rate estimated on this basis using the 1997-98 SIHC is 25.65 per cent (see Table 1). This estimate is at the upper end of poverty estimates for Australia but reflects the inclusion in our study of teenage and full-time student income units together with income units with negative or zero cash disposable income. For owner occupiers, the head count CDI poverty rate is somewhat lower than the corresponding rate across all income units at 17.47 per cent. Among owners with a mortgage, the head count CDI poverty rate is lower still at 10.33 per cent while for owners without a mortgage, the poverty rate lies closer to the national average at 22.95 per cent.

The difference in CDI head count poverty rates between owners with a mortgage and outright owners reflects, in the main, life cycle and housing career effects. As is evident in Figure 1, the rate of outright home ownership in older age categories is very high (over 50 per cent by the 50 and over age cohort). However, many of those in the older age categories fall in the ‘asset rich income poor’ category. This makes them vulnerable to poverty on a CDI basis, a fact borne out when we graph before-housing CDI poverty rates by age category as is done in Figure 2. Before-housing poverty rates are extremely high for the young (who also have very low rates of home ownership). Poverty rates then fall rapidly before rising slowly again among older age categories.

Under the Henderson poverty line method, the direct housing outlays of the income unit are deducted from the cash disposable income of the income unit and the subsequent after-housing cost income compared with a similarly defined poverty line which subtracts off notional housing outlays. These outlays are based on ‘basic-level’ rental costs in the private rental market. Outright owners face relatively low direct housing costs (council and water rates in the main). Owners without a mortgage will, therefore, tend to be in a better position using an after-housing cost CDI poverty measure than a before-housing cost CDI measure. This fact is borne out in the estimates presented in Table 1. The after-housing cost CDI-based rate of poverty for owners without mortgages is 7.09 per cent (compared with the before-housing rate of poverty of 22.95 per cent) whereas for owners with mortgages the after-housing cost rate of poverty is 10.72 almost exactly equal to the corresponding before-housing rate of poverty.

Let us now consider the impact of measuring poverty on a net comprehensive income (NCI) basis. We continue to focus on the head count measure of poverty for the time being. Consider first estimates of poverty using the 5 per cent return on realised equity assumption. In other words, we assume a 100 residual capital value annuity is purchased using the post-housing equity conversion sum whose income stream is set at 5 per cent of the annuity value. The effect of utilising the NCI measure (and the 5 per cent return assumption) is to reduce the rate of before-housing poverty by 6 percentage points across all income unit types from 25.65 (for the CDI measure) to 19.04 per cent (in the case of the NCI measure). In the case of owner occupiers, the head count rate of poverty falls dramatically from 17.47 per cent (for the CDI measure) to 6.19 per cent. Given the construction of the net comprehensive measure, all of this fall must be attributed to owner occupiers.

As is evident in Table 1, the drop in the head count poverty rate between the CDI and NCI measures is most apparent among owners without mortgages than for owners with mortgages. In the former category, the head count poverty rate falls from 22.95 per cent to 6.32 per cent while for owners with mortgages the fall in the poverty rate is much smaller moving from 10.33 per cent to 6.03 per cent. The reason for the smaller drop in the poverty rate in the case of owners with mortgages principally reflects the higher mean value of the housing equity held by outright owners as compared to owners with mortgages. However, the outcome may also reflect differences in the socio-demographic and income support receipt composition of the two groups of income units together with the mean CDI poverty gap experienced by the two sets of owner occupiers. In terms of the former effect, different income units purchasing annuities to the same value will face different marginal effective tax rates on the income stream derived from the annuity. To illustrate the importance of this point, Flatau and Wood (2000) found that owner occupier government income support recipients with low to moderate housing equity face high marginal effective tax rates on receipt of income from an annuity purchased in the post-housing realisation phase. However, marginal effective tax rates
differed markedly between different categories of income support with so-called beneficiaries experiencing higher marginal effective tax rates than pensioners given the harsher income and assets tests that are applied to the former group. Hence, beneficiaries and pensioners with the same post-housing equity conversion asset value will experience differentiated gains in terms of after-tax income (inclusive of income support income). High marginal effective tax rates experienced by beneficiaries and pensioners act to dampen down the net income benefits from housing equity conversion but, as is evident in the poverty rate estimates in Table 1, the dampening down effect is insufficient to stop the movement out of poverty for such income units. Many low income outright owners in receipt of government income support payments lie just below the poverty line.

Under the net comprehensive approach to income measurement, annuity income is affected by the rate of return assumption utilised. We would, therefore, expect the incidence of poverty for owner occupiers to be similarly influenced by the rate of return assumption adopted. If we replace the 5 per cent return assumption with a 2 per cent return assumption, the head count measure of poverty on a NCI basis still falls from that evident for the CDI measure, but by what appears as a relatively small margin. For owner occupiers, the NCI poverty rate is 9.64 per cent under the 2 per cent rate of return scenario whereas it was 6.19 per cent under the 5 per cent scenario. This difference in poverty rates is much smaller than that noted earlier in respect to the move from a CDI to a NCI measure. We experience these smaller gains to poverty reduction on a head count measure principally because of a bunching of income units close to the poverty line.

Let us now turn to an analysis of after-housing cost poverty using an NCI measure. In the NCI approach, we adapt the Henderson after housing poverty measurement approach for owner occupiers by imputing to existing owner occupier income units a private rental payment that would be made if that income unit was to rent housing of equivalent market value in the private rental market. This is the housing cost that is then netted off from the NCI estimate for the income unit and compared to the Henderson poverty line which nets off a notional housing outlay consistent with assumed basic accommodation standards in the private rental market.

In the case of outright owners, the renting of a dwelling of equivalent market value in the private rental market implies higher rental payments than existing housing costs. Indeed, given the transaction costs involved in selling the home and the relatively high marginal effective tax rates that may apply to their income from the annuity (highest for income support recipients), the gain in income from housing equity realisation may be largely or more than offset by high direct housing costs in the post realisation position. Of course, as the value of the dwelling rises, so to does the assumed rental payment given the convention adopted in our model that the rental payment is set according to rent-to-value ratios in the private rental market. However, while different owner occupiers face the same post-housing equity conversion housing outlays for dwellings of equivalent market value, owner occupiers occupying the same dwellings do not face the same housing costs in the pre-conversion position. Owners with a mortgage are clearly in a different position to owners without mortgages. The degree of difference is related to the loan-to-value ratio for the existing property. Owners with high loan-to-value ratios experience high direct housing costs as owners due to high mortgage repayments but may face lower notional rental payments in private rental market.

If we return to the head count estimates of after-housing cost poverty contained in Table 1, we can see that the incorporation of housing costs substantially alters the position in relation to the incidence of poverty between the CDI and the NCI measures. For outright owners, we noted previously that a very large drop occurred in the head count rate of poverty when we moved from a CDI measure of income to a NCI basis. The poverty rate, however, rises when we move from the after-housing cost CDI measure (7.09 per cent) to the after-housing NCI measure (11.42 per cent using a 5 per cent rate of return estimate). Clearly the position worsens when we compare the 2 and 5 per cent scenarios. The after-housing poverty rate using the NCI measure is 22.59 per cent on a 2 per cent rate of return basis, this compares with a poverty rate of 7.09 on an after-housing CDI measure. In the case of owners with mortgages, the reverse is true. For a 5 per cent rate of return, the after-housing cost poverty rate of the owner with a mortgage on the NCI measure is 7.9 per cent as compared with 10.72 per cent under the CDI measure. Low income owners with a mortgage gain from lower housing costs in the private rental market.
We have shown that low income outright owners do not gain in terms of their after-housing poverty position on a NCI basis. Low income outright owners can improve their economic well-being in an after housing cost position only if one of the following occurs: the rate of return on the annuity rises (but private rent-to-value ratios do not at a corresponding rate), income units draw down capital in the post-housing conversion position and/or are able to trade in some of their existing equity in the home in an equity partnership access arrangement (a financial institution provides a lump sum for the equity which can be invested) or utilise a reverse mortgage option. The advantages of the latter arrangements are that selling transaction costs are eliminated (but there may be some costs associated with setting such arrangements up) and marginal effective tax rates may be reduced depending on the circumstances of the income unit.

The NCI measure only affects the income position of the owner occupier. Hence, we have focussed on the effect of the measure on this housing tenure category. It is instructive, however, to examine how the incidence of poverty is altered across different socio-demographic groups when we move from a cash disposable income measure to a net comprehensive measure. Such estimates are presented in Table 3 together with home ownership rates. Differences in home ownership rates, loan-to-value ratios, and government income support rates between socio-demographic groups, will result in wider or smaller gaps between the CDI and NCI rates of poverty. The effect can be illustrated by comparing the before-housing CDI and NCI rates of poverty between various labour force categories. For example, the CDI head count poverty rate for those not in the labour force is 38.3 per cent. However, the corresponding NCI rate is 23.9 per cent. This drop in the poverty rate is much larger than for the other labour force categories reflecting the life cycle housing career nexus we referred to earlier when discussing age-tenure and age-poverty profiles. A very high proportion of the not in the labour force category are low income outright owners and this consequently feeds through into a disproportionate drop in the poverty rate for this labour force category.

We have so far concentrated on the head count measure of poverty. As noted previously, the head count measure suffers from the fact that it does not take into account the mean poverty gap experienced by those in poverty nor the distribution of income of those in poverty. It therefore does not meet established poverty axioms. The $P_2$ measure of poverty meets these particular deficiencies. However, the picture that emerges of the extent of poverty remains roughly the same on a before-housing cost basis when a $P_2$ measure of poverty is utilised. The proportionate drop in poverty rates on a before-housing cost basis for outright owners and owners with mortgages is roughly comparable between the head count and the $P_2$ measure of poverty for both a 2 and 4 per cent rate of return.

However, a similar comparison undertaken on an after-housing cost basis reveals that the head count measure underestimates the impact that housing costs have on the poverty rate. As indicated previously, changes in the degree of inequality among the poor cannot be accommodated in the head count measure. The proportionate rise (drop) in poverty rates on a before-housing cost basis for outright owners (owners with mortgages) is much larger for the $P_2$ measure of poverty than for the head count measure.

We shall have more to say in regard to the $P_2$ measure of poverty in the following section where we turn to formal hypothesis tests examining whether or not there are statistically significant differences between rates of poverty on a CDI and NCI basis. These tests are conducted using the $P_2$ measure.

### Hypothesis tests

Kakwani (1994) shows that the sampling variance for $P_α$ can be calculated as follows.

$$\text{var} \left( \sqrt{N} P_α \right) = P_{2α} - P_α^2$$
var(\sqrt{N} P_\alpha) can be used to perform hypothesis tests regarding estimates of $P_\alpha$ using different definitions of income. We are interested in testing the following two sets of hypotheses concerning $P_\alpha$ ($\alpha = 2$). First, is the extent of poverty utilising a net comprehensive income measure different from that obtained when a cash disposable income measure is used (across all income units, for all owner occupiers, and for owners with and without mortgages)? Second, is our conclusion affected when housing costs are accounted for?

For all cases we test $H_0 : P_1 = P_2$ against $H_1 : P_1 \neq P_2$. P in this case is assumed to be the $P_\alpha$ $\alpha = 2$ measure and the hypothesis test compares CDI and NDI poverty estimates. The test statistic under the null hypothesis is distributed as a standard normal variable, $z$. The $z$-statistic is defined as

$$z = \frac{P_1 - P_2}{\sqrt{\text{var}(P_1) + \text{var}(P_2) + \text{cov}(P_1, P_2)}}$$

There is not an easy way to calculate $\text{cov}(P_1, P_2)$. However, we know that the correlation between $P_1$ and $P_2$ must be between $\pm 1$ and is defined as

$$\text{corr}(P_1, P_2) = \frac{\text{cov}(P_1, P_2)}{\sqrt{\text{var}(P_1) \text{var}(P_2)}}$$

As a result the bounds for the covariance will be $\pm \sqrt{\text{var}(P_1) \text{var}(P_2)}$. Using the bounds of the covariance we can calculate the bounds for the $z$-statistics and the results are reported in Table 3 below.

As is evident from the results in Table 3, the null hypothesis of $H_0 : P_1 = P_2$ is clearly rejected at the 5 per cent level of significance for the $P_\alpha$ $\alpha = 2$ measure of poverty in the case of the before housing poverty rate for outright owners. The same hypothesis is not rejected in the case of owners with mortgages. However, as is evident in the results in Table 3, the outright owner effect is so large that the hypothesis is rejected for owner occupiers generally and even across all tenure types (for the 5 per cent return case certainly though and almost certainly in the 2 per cent return case). The null hypothesis of $H_0 : P_1 = P_2$ for the after-housing poverty rate is rejected for both outright owners and owners without mortgages using the 5 per cent rate of return assumption but not for owners with mortgages using the 2 per cent rate of return assumption.

We now turn to the impact the use of different measures of income have on the degree of inequality in income in Australia. Here we examine the impact of the NCI measure across the full distribution of income and not just at the tail of the distribution. Let $y_1 < y_2 < \ldots < y_i < \ldots < y_N$ represent the income (either disposable cash income or net comprehensive income) of $N$ individuals. A common inequality measure used is the Gini coefficient. Let $F(y)$ represent the distribution function for income $y$. The Gini coefficient can be expressed as

$$G = (2/\mu) \text{cov} \{y, F(y)\}$$

where $\mu$ is the mean income.  

Kakwani et al. (1997) developed a distribution-free asymptotic estimator for the variance of $G$ for the case of individual data as follows: Let:

$$a_i = \frac{y_i}{\mu} \left[ \left( \frac{2i-1}{N} \right) - 1 - G \right] + 2 - q_{i-1} - q_i$$
and $q_i = \frac{1}{\mu} \sum_{j=1}^{i} y_j$ with $q_0 = 0$

An estimate of the sampling variance can be obtained as:

$$\hat{\text{var}}(G) = \frac{1}{N} \left[ \frac{1}{N} \sum_{i=1}^{N} q_i^2 - (1 + G)^2 \right]$$

This variance is used to perform hypothesis tests regarding estimates of $G$ using different definitions of income. As with the case of our poverty analysis, we are interested in testing the following sets of hypotheses: Is the inequality of income utilising a net comprehensive income measure different from that obtained when a cash disposable income measure is used (across all income units, for all owner occupiers, and owners with and without mortgages)? Is this conclusion affected by whether or not we have netted off housing costs?
### TABLE 3
Foster poverty measure ($\alpha = 2$) hypothesis tests, all income units and owner occupier income units, Australia, 1996-97

<table>
<thead>
<tr>
<th>Hypothesis and rate of return assumption</th>
<th>All income units</th>
<th>All owner occupiers</th>
<th>Owners with a mortgage</th>
<th>Owners without a mortgage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z-statistic</td>
<td>Decision</td>
<td>z-statistic</td>
<td>Decision</td>
</tr>
<tr>
<td>5 per cent return on post-conversion housing equity</td>
<td>z-statistic</td>
<td>Decision</td>
<td>z-statistic</td>
<td>Decision</td>
</tr>
<tr>
<td>$H_0 : P_{CDI} = P_{NCI}$</td>
<td>3.12 – 5.38</td>
<td>Reject $H_0$</td>
<td>8.18 – 13.75</td>
<td>Reject $H_0$</td>
</tr>
<tr>
<td>$H_0 : P_{CDIH} = P_{NCIH}$</td>
<td>-1.28 - -2.21</td>
<td>Not sure</td>
<td>-2.69 - -4.63</td>
<td>Reject $H_0$</td>
</tr>
<tr>
<td>2 per cent return on post-conversion housing equity</td>
<td>z-statistic</td>
<td>Decision</td>
<td>z-statistic</td>
<td>Decision</td>
</tr>
<tr>
<td>$H_0 : P_{CDI} = P_{NCI}$</td>
<td>1.93 – 3.34</td>
<td>Not sure</td>
<td>4.58 – 7.92</td>
<td>Reject $H_0$</td>
</tr>
<tr>
<td>$H_0 : P_{CDIH} = P_{NCIH}$</td>
<td>-5.99 - -10.25</td>
<td>Reject $H_0$</td>
<td>-11.62 - -19.15</td>
<td>Reject $H_0$</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations based on the 1997-98 Survey of Income and Housing Costs Confidentialised Unit Record File. The annual 1996-97 incomes from this file are used for estimation purposes.

Legend: $P$: The poverty measure using $\alpha = 2$, $CDI$: Cash disposable income, $NCI$: Net comprehensive income, $CDIH$: Cash disposable income (after housing costs), $NCIH$: Net comprehensive income after housing costs.
A 5 per cent level of significance is used in the above tests.
As in the case of the Foster poverty measures, we test $H_0 : G_1 = G_2$ against $H_1 : G_1 \neq G_2$. We use a $t$-test for this purpose. The $t$-statistic is defined as

$$t = \frac{G_1 - G_2}{\sqrt{\text{var}(G_1) + \text{var}(G_2) + \text{cov}(G_1, G_2)}}$$

There is not an easy way to calculate $\text{cov}(G_1, G_2)$. However, we know that the correlation between $G_1$ and $G_2$ must be between ±1 and is defined as

$$\text{corr}(G_1, G_2) = \frac{\text{cov}(G_1, G_2)}{\sqrt{\text{var}(G_1)\text{var}(G_2)}}$$

As a result the bounds for the covariance will be $\pm \sqrt{\text{var}(G_1)\text{var}(G_2)}$. Using the bounds of the covariance we can calculate the bounds for the $t$-statistics and the results are reported below.

Table 4 presents the Gini coefficients and the relevant standard errors. As with the Foster poverty measure analysis, the results are set out for different rates of return on the annuity purchased in the post-housing conversion position. Table 5 presents the bounds for the $t$-statistics and the accompanying decisions in relation to the $t$-tests.

The level of inequality, as measured by the Gini coefficient, for the CDI measure across all income units displayed in Table 4 (0.3975) is somewhat higher than similar recent estimates for Australia although the difference is not great. The degree of income inequality is considerably lower for owners with mortgages (0.2763) than owners without mortgages (0.4096). The latter high Gini coefficient arises primarily from the fact that the outright owners group includes a large number of ‘asset rich income poor’ income units who have low income-generating assets other than their home which they own. The Gini coefficient for outright owners falls from 0.4096 on a CDI basis to 0.3433 (5 per cent rate of return) on a NCI measure of income.

Is this fall in the Gini coefficient significant in a statistical sense? From Table 5, the null hypothesis that the CDI and NCI Gini coefficients are equal (on a before housing cost basis) is clearly rejected and this rejection also applies for the 2 per cent rate of return assumption. No such significant fall is, however, evident in the case of owners without mortgages. Despite this, the impact of the outright owners fall is sufficient in itself to ensure that the hypothesis of equal Gini coefficients is rejected across all housing tenure type income units (for the 5 per cent rate of return assumption). In terms of an after housing cost CDI and NCI comparison, the null hypothesis of equal Gini coefficients is rejected for all housing tenure categories.

IV Conclusion

The key aim of this paper was to examine the impact that the use of a net comprehensive income measure has on estimates of the extent of before- and after-housing cost poverty and on income inequality in Australia. The net comprehensive income measure imputes an income for owner occupied housing equity by notionally realising that equity and determining the after tax-transfer income of the owner occupier income unit in the post-housing conversion state inclusive of the income derived from an annuity investment. In spite of high marginal effective tax rates on housing equity realisation (Flatau and Wood, 1999) our analysis shows that the rate of poverty and the degree of income inequality among outright owners in Australia is significantly reduced when a net comprehensive income measure is utilised in place of a cash disposable income measure. The poverty and income inequality reducing effect is much weaker for owners with mortgages. Across all owner occupiers and, indeed, across all Australian income units, however, the poverty and income inequality reducing effect remains statistically significant.

Quite different results are evident if we focus on the after-housing cost position of income units. Outright owners experience low direct housing costs in their current housing tenure position. On realisation of their housing asset, (notional) housing costs rise as a private rental payment is imputed to the owner occupier. The result is that ‘asset rich but income poor’ outright owner income units on an after housing cost basis make little headway but owners with mortgages are in an improved position.
While the emphasis in this paper is on measurement issues, there remains an important policy question connected to this research agenda. That is, how can ‘asset rich but income poor’ income units better realise their housing wealth without increasing significantly direct housing outlays. Options involving equity partnerships where the income unit remains in their dwelling but foregoes some equity and invests that realised equity sum is one option worth pursuing.
<table>
<thead>
<tr>
<th>Income measure and rate of return assumption</th>
<th>All income units</th>
<th>All owner occupiers</th>
<th>Owners with A mortgage</th>
<th>Owners without A mortgage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDI 5 per cent return on</td>
<td>0.3975</td>
<td>0.3665</td>
<td>0.2763</td>
<td>0.4096</td>
</tr>
<tr>
<td></td>
<td>(0.0033)</td>
<td>(0.0042)</td>
<td>(0.0058)</td>
<td>(0.0062)</td>
</tr>
<tr>
<td>NCI</td>
<td>0.3780</td>
<td>0.3189</td>
<td>0.2659</td>
<td>0.3433</td>
</tr>
<tr>
<td></td>
<td>(0.0033)</td>
<td>(0.0039)</td>
<td>(0.0055)</td>
<td>(0.0057)</td>
</tr>
<tr>
<td>CDI (HC) 2 per cent return</td>
<td>0.4264</td>
<td>0.3929</td>
<td>0.3357</td>
<td>0.4293</td>
</tr>
<tr>
<td></td>
<td>(0.0037)</td>
<td>(0.0047)</td>
<td>(0.0068)</td>
<td>(0.0064)</td>
</tr>
<tr>
<td>NCI (HC)</td>
<td>0.4253</td>
<td>0.3888</td>
<td>0.3150</td>
<td>0.4267</td>
</tr>
<tr>
<td></td>
<td>(0.0036)</td>
<td>(0.0046)</td>
<td>(0.0065)</td>
<td>(0.0066)</td>
</tr>
<tr>
<td></td>
<td>0.3881</td>
<td>0.3445</td>
<td>0.2723</td>
<td>0.3776</td>
</tr>
<tr>
<td></td>
<td>(0.0033)</td>
<td>(0.0041)</td>
<td>(0.0056)</td>
<td>(0.0059)</td>
</tr>
<tr>
<td></td>
<td>0.4499</td>
<td>0.4349</td>
<td>0.3301</td>
<td>0.4960</td>
</tr>
<tr>
<td></td>
<td>(0.0037)</td>
<td>(0.0049)</td>
<td>(0.0067)</td>
<td>(0.0069)</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations based on the 1997-98 Survey of Income and Housing Costs Confidentialised Unit Record File. The annual 1996-97 incomes from this file are used for estimation purposes.

Legend: CDI: Cash disposable income, NCI: Net comprehensive income. HC refers to housing costs and the resulting estimate of the Gini coefficient is based on income net of housing costs. In the case of the CDI measure, these housing costs are the actual housing costs of income units. In the case of the NCI measure, owner occupier housing costs are the notional rental costs on equivalent housing, while for renters, housing costs are actual housing costs.

Note. Figures in brackets are standard errors. In the case of the cash disposable income measure, there is no difference in incomes between different rates of return and hence no difference in Gini coefficients. Estimates of poverty are provided for two scenarios. A 5 per cent rate of return (paid on a 100 per cent residual capital value annuity) and a 2 per cent rate of return. In the case of the cash disposable income measure, there is no difference in incomes between different rates of return and hence no difference in rates of poverty between the two different rates of return.

Standard errors are in brackets.
<table>
<thead>
<tr>
<th>Hypothesis and rate of return assumption</th>
<th>All income units</th>
<th>All owner occupiers</th>
<th>Owners with a mortgage</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-statistic</td>
<td>Decision</td>
<td>t-statistic</td>
<td>Decision</td>
</tr>
<tr>
<td></td>
<td>range</td>
<td></td>
<td>range</td>
<td></td>
</tr>
<tr>
<td>5 per cent return on post-conversion housing equity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( H_0 : G_{CDI} = G_{NCI} )</td>
<td>3.41 – 5.91</td>
<td>Reject ( H_0 )</td>
<td>6.78 – 11.73</td>
<td>Reject ( H_0 )</td>
</tr>
<tr>
<td>( H_0 : G_{CDIH} = G_{NCIH} )</td>
<td>0.17 – 0.30</td>
<td>Do not reject ( H_0 )</td>
<td>0.51 – 0.88</td>
<td>Do not reject ( H_0 )</td>
</tr>
<tr>
<td>2 per cent return on post-conversion housing equity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( H_0 : G_{CDI} = G_{NCI} )</td>
<td>1.64 – 2.85</td>
<td>Not sure</td>
<td>3.02 – 5.23</td>
<td>Reject ( H_0 )</td>
</tr>
<tr>
<td>( H_0 : G_{CDIH} = G_{NCIH} )</td>
<td>-3.67 – -6.35</td>
<td>Reject ( H_0 )</td>
<td>-5.05 – -8.74</td>
<td>Reject ( H_0 )</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations based on the 1997-98 Survey of Income and Housing Costs Confidentialised Unit Record File. The annual 1996-97 incomes from this file are used for estimation purposes.

Legend: \( G \): The Gini coefficient, \( CDI \): Cash disposable income, \( NCI \): Net comprehensive income, \( CDIH \): Cash disposable income (after housing costs), \( NCIH \): Net comprehensive income after housing costs.

A 5 per cent level of significance is used in the above tests.
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Australian Bureau of Statistics (1999b), Rental Investors Survey June 1997, Confidentialised Unit Record File (CURF), Cat. No. 8711.0, Canberra: Commonwealth of Australia


Nygård, F. and A. Sandström (1981), Measuring Income Inequality, Almqvist & Wiksell, Stockholm.


1. Other criticisms of the standard Henderson line approach include the difficulties involved in drawing the poverty line, determining standard housing costs and establishing a set of equivalence scales; the assessment of poverty status on a single indicator rather than a cluster of indicators of well-being; and, the head count and poverty gap approach to measuring the incidence and severity of poverty. See Townsend, 1979; Hagenaars, 1986; Atkinson, 1987; Ruggles, 1990 and Saunders, 1994 for general reviews on poverty measurement.

2. Reverse annuity mortgages are a financial instrument that enable home owners to convert their net housing worth while continuing to occupy their dwellings. But these are restricted generally to the elderly, and take-up has been limited.

3. Home owners may, of course, use their realised housing equity to purchase a new home (i.e. down size) but we do not consider that option in what follows.

4. Conceptually, the approach taken here deals with similar problems to those posed when measuring the contribution to economic well-being of the wages of a second earner in income units. The change in disposable cash income alone overstates the improvement in economic well-being, as the income of a second earner will be accompanied by a decline in the value of home production and leisure. The measurement issue then becomes one of imputing a value to the decline in home production and leisure (see Saunders et al., 1994 for a more detailed discussion of the issues).

5. Exceptions are de Leeuw and Ozanne (1990) and King and Atkinson (1980).

6. New South Wales and Victorian State branches have since 1990 discontinued this practice, following deregulation measures introduced by State Governments in these States.

7. We do not consider alternative annuity options such as those with lower residual capital values as our conceptual framework assumes the maintenance of 100 per cent of the realised housing equity over time. The purchase of an annuity with less than 100 per cent residual capital value results in higher immediate consumption possibilities for the income unit. It is possible to extend the present framework by allowing for the drawdown of the capital value of the realised equity over the expected lifetime of the individual. We may also note that the framework adopted in this paper only considers direct current housing costs and ignores the role of economic costs.

8. The 1997-98 SIHC CURF does not include information on tax deductions. Information on tax deductions are based on Australian Tax Office estimates. We would like to acknowledge the assistance of Richard Watson in providing this information. Family allowance and family allowance supplement payments together with other non-taxable elements of total entitlement have been subtracted from assessable income.

9. Several other alternatives for expressing the Gini coefficient have been described in the literature. See for example, Table 8.1 in Nygard and Sandstrom (1981) or Creedy (1996, p.10, 20).