

# An exploration of alternative treatments of owner-occupied housing in a CPI

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## Introduction

Deciding how to treat owner-occupier housing costs in the Consumer Price Index (CPI) is arguably the most important issue to be addressed by national statisticians. The *Resolution concerning consumer price indices adopted by the Seventeenth International Conference of Labour Statisticians, 2003*<sup>2</sup> (the Resolution), recognises three alternative approaches for defining the coverage of a CPI – the “*acquisitions*”, “*use*” and “*payments*” approaches – with the advice that the choice of approach is best determined by consideration of the purposes for which the index is to be used.

The *Consumer price index manual: Theory and practice 2004* (the manual), devotes considerable space to discussing the theoretical strengths and weaknesses of these alternative approaches and describes the data requirements for each. Importantly, the manual also presents two major variants of the use approach, one based on rental equivalence and the other on user cost.

The purpose of this paper is to shed some light on the practical implications of the alternative approaches by constructing two period (bilateral) measures of price change using the alternative approaches for an Australian capital city. The two periods used in the study are the financial years 1998-99 and 2003-04 (which in Australia correspond to the four quarters ended June 1999 and June 2004 respectively). These periods were chosen because they correspond with the two latest periods for which Household Expenditure Survey (HES) data are available. Sydney was selected as the city for the study.

## Methodology

Expenditure data from the HES was aggregated to the expenditure class<sup>3</sup> level used in compiling the CPI for most of this period. The expenditure class level data was then partitioned into those categories included in the Housing group of the Australian CPI and the rest (referred to as ‘all items excluding housing’) noting that in Australia dwelling and contents insurance is not classified to housing but included in a broader aggregate for all insurance services acquired by households. The aggregate for ‘all items excluding housing’ comprises 82 expenditure classes. CPI price indexes for the Sydney expenditure classes were used to construct expenditure class level measures of price change between 1998-99 and 2003-04.

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<sup>1</sup> The views expressed in this paper are those of the author and do not necessarily represent the position or policies of the Australian Bureau of Statistics (ABS).

<sup>2</sup> See Annex 3 to *Consumer price index manual: Theory and practice*.

<sup>3</sup> The expenditure class represents that level for which CPI weights are fixed between major weight updates and corresponds to the lowest level for which price indexes are published.

An aggregate index for ‘all items excluding housing’ was constructed using the HES data as weights and the CPI measures of price change. Because weighting data is available for both 1998-99 and 2003-04, it was possible to compile Laspeyres, Paasche and Fisher indexes for this aggregate which was held to be common to all alternative measures to be produced<sup>4</sup>.

For ease of presentation, a separate index was also constructed to cover those four housing expenditure classes that are independent of the nature of housing tenure, namely Electricity, Gas and other household fuels, Water and sewerage, and House repairs and maintenance. This aggregate has been named ‘Utilities, repair and maintenance’.

The construction of a measure for rents paid by renter households was straightforward. Expenditure on rents is available directly from the HES and a CPI price measure for dwelling rents is also available.

The items that are peculiar to owner-occupiers under the alternative conceptual approaches are shown in Table 1 below.

**Table 1: Costs peculiar to owner-occupiers by approach.**

<i>Item</i>	<i>Acquisitions</i>	<i>Use</i>		<i>Payments</i>
		<i>Rental equivalence</i>	<i>User cost</i>	
House purchase	X			
Property rates and charges	X		X	X
Owner-occupier rents		X		
Owner-occupier user costs			X	
Mortgage interest charges				X

The rationale for each of these items is outlined in the following sections together with a description of the estimation methodology where considered relevant.

### House purchase

The rationale for including this measure in an acquisitions index is that the purchase of a dwelling for owner occupation should not be treated any differently to the purchase of other durable goods like motor vehicles. All durables provide a flow of services that extend well beyond the period in which the durable is acquired, the fact that houses are the most long-lived durable should not have any bearing on how they are treated in the CPI. For the purpose of inflation measurement it is also argued that a market exists for houses and to the extent that price change in this market is experienced by the household sector, then changes in house prices should be incorporated into an overall inflation measure for the household sector.

But houses do differ from other durable goods in one important respect. While most other durables eventually wear out and become worthless, history has shown housing to be a good store of wealth for the long term. In the main this can be attributed to the fact that dwellings comprise both a structure and the land on which the structure sits. While the structure may eventually wear out, the land remains largely unchanged

<sup>4</sup> In other words the acquisitions approach used in compiling the Australian CPI has been used universally to measure price change for ‘all items excluding housing’.

(except in exceptional circumstances like earthquakes) and given its relatively fixed supply will tend to experience a real increase in value over time.

Recognising the legitimacy of these various viewpoints the ABS concluded that, in the eyes of households, owner-occupied dwellings represent a combination of consumption and investment, and has elected to include house purchase in the CPI on a structure only basis (i.e. the value and price of land is excluded as representing the investment component).

The approach adopted in this study is identical to that followed in the Australian CPI. The expenditure represents the value of the net addition to the stock of owner-occupied housing excluding land. In practice this covers the purchase of newly constructed dwellings, purchase of ex-rental dwellings and the value of any alterations and additions to existing dwellings. The price measure is that used in the CPI which is based on a price index for prices paid for project homes (i.e. prices paid for the construction of dwellings on the purchasers' block of land).

#### Property rates and charges

These constitute an inescapable cost of home ownership and cover the general rates and charges levied by local authorities on property owners. They are considered to be a legitimate inclusion in all approaches except the rental equivalence approach (where rates and charges would be borne by landlords and hence recovered through market rents). The amounts levied are generally a function of the value of the property. The expenditure on property rates and charges is available from the HES and a price measure is available from the CPI.

#### Owner-occupier rents

The use approach defines the coverage of the CPI as comprising all those goods and services actually consumed by households. In the case of owner-occupied housing the objective is to place a value on the shelter services consumed by the occupiers in each period. The rationale for imputing rents for owner-occupier households is that the value of the shelter service is best estimated by the market rent that would be charged by an unrelated landlord. Imputing rents for owner-occupiers in this way is also useful for comparing living standards of different households. To the extent that living standards are determined by the volume of goods and services consumed, treating shelter services obtained from owner-occupied housing symmetrically with shelter services obtained in the market (i.e. rents) allows for the direct comparison of aggregate consumption expenditures<sup>5</sup> across households regardless of tenure.

The expenditure estimates for the two periods (1998-99 and 2003-04) are based on a combination of data from the HES and data from the Australian national accounts. The HES provides data on the numbers of owner-occupier versus renter households and the average rent paid by renters. The national accounts data can be used to derive a ratio between the average rent imputed for owner-occupiers and the average rent paid by renters. This ratio was applied to the HES estimates of the average rent paid by renters in Sydney to derive an imputed average rent for owner-occupiers in Sydney. The CPI price measure for actual rents was used for owner-occupier rents.

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<sup>5</sup> Note that it is generally recognised that the volume of goods and services consumed is only a partial indicator of a household's standard of living as it fails to account for externalities such as clean air, crime rates etc.

### Owner-occupier user costs

While the rental equivalence approach uses market rents to value the output of shelter services produced by owner-occupier households, the objective of the user cost approach is to estimate the cost of producing these shelter services. An argument put forward for taking this approach is that it treats own production of shelter services symmetrically with own production of things like home produced meals where the CPI includes the cost of the various inputs (meat, vegetables, power etc) and does not attempt to estimate the market prices of the home produced meals themselves.

This is the most difficult component to estimate. The objective is to construct a conventional measure of the user cost of capital in both periods on an ex post basis. This user cost would equal the net cost that would be incurred by purchasing a house at the start of each year and selling it at the end of the year. The owner would incur interest costs during the period of ownership (actual in the case of borrowed funds or forgone in the case of own funds which could otherwise have earned interest) and a depreciation expense (required to return the house to its original condition at the end of the period of ownership). Offsetting these expenses would be any capital gain (the selling price at the end of the year less the purchase price).

Estimation of the average user cost per owner-occupier household in each year requires:

1. A start of year average house price;
2. The proportion of the total price accounted for by the structure alone (for use in estimating depreciation);
3. A measure of through the year change in house prices (including land);
4. A measure of through the year change in construction costs;
5. A depreciation rate;
6. A start of year debt to equity ratio;
7. A year average mortgage interest rate; and
8. A year average alternative use of funds interest rate.

Estimates for 1 and 2 were derived from real estate transfer data. The ABS price indexes for established houses and project homes were used for 3 and 4 respectively. A depreciation rate (5) was estimated from national accounts data. A debt to equity ratio (6) was estimated using HES data and modelling. Year average interest rates were estimated from data from financial institutions (7) and from published Reserve Bank of Australia data on 180 day bank bill rates (8).

The choice of Sydney for the construction of these alternative measures was not arbitrary. Of the eight capital cities included in the Australian CPI, Sydney was the only city for which a positive estimate for user cost could be derived for both years under consideration. Noting that even for Sydney a negative result would have been obtained for at least one of the intervening years.

The general problem experienced in constructing a price index for user cost (at least for housing) is that it is not uncommon for rates of house price inflation to exceed prevailing interest rates. In these circumstances capital gains can often exceed interest

costs and depreciation giving a negative price which proves problematic for index construction!

A number of people have suggested adopting modified measures of user cost to overcome this problem. These range from constructing ex ante measures based on long run rates of house price inflation (on the premise that the long run rate will be lower than current interest rates) through to the use of some exogenous (broader) real rate of interest rather than the real rate given by the difference between the asset specific rate of inflation and the prevailing nominal rate of interest. For example, Woolford et al (2005) estimated gross (or partial) measures of user costs based only on the interest components (i.e. ignoring both depreciation and capital gains) for use in constructing spatial measures of price cities across Australian capital cities. None of these alternative user cost approaches are particularly appealing in the context of a temporal price index<sup>6</sup>.

The full user cost measure as outlined above has a very clear interpretation and the regular construction of measures of the user cost of housing would seem to be very informative in its own right<sup>7</sup>. The adoption of a variant that serves to remove those features of the measure that are inconvenient for price index construction would seem to be at odds with the endeavours to produce more and more refined estimates for much less important components (e.g. use of scanner data for coffee indexes). The question really is, does a user cost measure of owner-occupier housing belong in a consumer price index?

It is difficult to reconcile the user cost measure with either of the generally accepted major uses of a CPI – income adjustment and/or inflation measurement for macro economic purposes. All other things being equal, in periods of rapidly rising house prices an index incorporating a user cost measure will show a smaller rate of price change than otherwise (and vice versa). If such an index was to be used to adjust the incomes of (say) retirees, the implication is that they are able to offset the impact of general price increases by drawing down on the increased value of the equity in their homes. While the advent of innovative financial instruments like reverse mortgages may make this possible, it is unlikely to be adopted as a policy objective. In the absence of mechanisms to allow ready access to housing equity, the simple adjustment of fixed income payments by such an index will result in volatility of real incomes in terms of purchasing power. From a macro economic policy perspective it also seems implausible that high rates of asset price inflation should serve to reduce a measure of general price inflation.

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<sup>6</sup> In the spatial context described in Woolford et al (2005), the problem was one of devising a suitable (reasonable) scalar or weight to enable differences in house prices to be incorporated in the aggregate measure. The gross (or partial) user cost approach seemed to satisfy this requirement.

<sup>7</sup> In particular, given that both user cost and rental equivalence measures are based on average prices/costs (rather than marginal) the differences between these two measures are likely to be of great interest. It would of course be generally expected that rational households would engage in owner-occupation provided the cost of doing so (user cost) was less than the value of the shelter service produced (rental equivalence).

### Mortgage interest charges

The objective of a payments based CPI is to measure changes in those ‘prices’ that impact on the purchasing power of the net money incomes of households (i.e. money incomes after payment of income taxes). Although it is well recognised that interest rates are not prices for specific goods or services in the conventional sense, it is also well known that mortgage interest payments account for a significant share of the net money incomes of households and that changes in mortgage interest rates impact on the overall purchasing power of money incomes. It is equally well recognised that of all the variants of a CPI, the payments approach is least well suited as a general measure of inflation for monetary policy purposes.

The ABS compiles price measures for mortgage interest charges for use in some analytical ‘living cost’ indexes published periodically for selected household types. These measures are constructed using an eight year debt profile approach. The expenditure estimates for mortgage interest charges are available from the HES and the price measures sourced from the analytical living cost indexes.

## Results

Table 2 below presents summary results from this study. To provide a benchmark the first set of results relate to an index that excludes any costs peculiar to owner-occupiers (it is also the case that this practice is followed in some national CPIs).

**Table 2: Summary results**

	1998-99		2003-04				
	Expenditure \$	Weight %	Expenditure \$	Weight %	Indexes (1998-99 = 100.0)		
					Laspeyres	Paasche	Fisher
<b>Excluding owner-occupied housing</b>							
Housing	93.48	12.9	120.65	13.3	117.4	117.3	117.3
Utilities, repairs and maintenance	39.83	5.5	49.57	5.5	121.4	121.5	121.4
Actual rents	53.65	7.4	71.08	7.9	114.5		
All excluding housing	632.95	87.1	783.50	86.7	116.5	112.7	114.6
Total	726.42	100	904.15	100	116.6	113.3	114.9
<b>Acquisitions</b>							
Housing	164.78	20.7	210.81	21.2	121.8	121.5	121.6
Utilities, repairs and maintenance	39.83	5.0	49.57	5.0	121.4	121.5	121.4
Actual rents	53.65	6.7	71.08	7.1	114.5		
House purchase	61.00	7.6	77.42	7.8	129.0		
Property rates and charges	10.30	1.3	12.74	1.3	119.2		
All excluding housing	632.95	79.3	783.50	78.8	116.5	112.7	114.6
Total	797.73	100	994.31	100	117.6	114.4	116.0
<b>Rental equivalence</b>							
Housing	241.91	27.7	299.18	27.6	115.6	115.6	115.6
Utilities, repairs and maintenance	39.83	4.6	49.57	4.6	121.4	121.5	121.4
Actual rents	53.65	6.1	71.08	6.6	114.5		
Owner-occupier rents	148.43	17.0	178.53	16.5	114.5		
All excluding housing	632.95	72.3	783.50	72.4	116.5	112.7	114.6
Total	874.86	100	1082.68	100	116.2	113.5	114.8
<b>User cost</b>							
Housing	121.12	16.1	305.97	28.1	247.4	234.6	240.9
Utilities, repairs and maintenance	39.83	5.3	49.57	4.6	121.4	121.5	121.4
Actual rents	53.65	7.1	71.08	6.5	114.5		
Owner-occupier user costs	17.34	2.3	172.58	15.8	1023.9		
Property rates and charges	10.30	1.4	12.74	1.2	119.2		
All excluding housing	632.95	83.9	783.50	71.9	116.5	112.7	114.6
Total	754.07	100	1089.47	100	137.5	131.9	134.7
<b>Payments</b>							
Housing	141.29	18.2	205.13	20.7	110.5	106.5	108.5
Utilities, repairs and maintenance	39.83	5.1	49.57	5.0	121.4	121.5	121.4
Actual rents	53.65	6.9	71.08	7.2	114.5		
Mortgage interest charges	37.51	4.8	71.74	7.3	90.8		
Property rates and charges	10.30	1.3	12.74	1.3	119.2		
All excluding housing	632.95	81.8	783.50	79.3	116.5	112.7	114.6
Total	774.24	100	988.62	100	115.4	111.3	113.3

For each of the alternative measures the table shows average weekly expenditure per household and the relative weight for each of the key aggregates in both 1998-99 and 2003-04 in addition to the index outcomes. The expenditure and weight information can be used to assess both the relative size of the various item domains and the relative stability of weights over time.

## Observations/comments

The choice of treatment of owner-occupier housing costs can have a significant impact on the CPI.

Based on 1998-99, the expenditure aggregates vary from a low of \$726.42 (excluding owner-occupied housing) to \$874.86 (rental equivalence) – a 20% difference. The relative weight for housing also varies from a low of 12.9% (excluding owner-occupied housing) to 27.7% (rental equivalence). However, of the measures that include owner-occupied housing, the weight for housing varies from a low of 16.1% (user cost) to a high of 27.7% (rental equivalence).

A similar picture emerges in 2003-04 with the exception that the weight for housing under user cost increases to 28.1% (from 16.1% in 1998-99). The volatility of this weight over time would be a concern even if it was to remain positive.

The aggregate Laspeyres price indexes for all variants except user cost lie within a relatively narrow band – 115.4 for payments to 117.6 for acquisitions. The user cost outcome of 137.5 is clearly the odd one out.

## References

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