The Real Story of Housing Prices in Australia from 1970 to 2003

Peter Abelson and Demi Chung

Macquarie University

Abstract

Despite the popular and public policy interest in housing prices, there have been few reliable published data for housing prices in Australia. In this paper we aim to provide an authoritative account of prices for houses and apartments (units) in Australia from 1970 to 2003. Where possible we draw on data from land title offices or on studies that draw on these data, but we also draw on supplementary data in some cases. The first part of the paper describes the major data sources on Australian house prices. The main body of the paper provides our best estimates of median house and unit prices and real price indices in the capital cities and in the rest of Australia along with explanations for their derivations. We also estimate how improvements in housing quality have influenced real house prices.

JEL: R31

1   Introduction

In Australia, as in many countries, there have been few reliable data on housing prices.[1] Until recently, public agencies published few data on housing prices and private agencies filled the gap by drawing on their own partial and usually biased data sets of residential property sales. Although the availability and quality of housing price data have improved in the last 10 to 15 years, the Reserve Bank (2004) still finds that the data are untimely and unreliable.

The aim of this paper is to provide an authoritative account of prices for houses and apartments (units) in Australia from 1970 to 2003. Without accurate data, econometric analyses and other explanations of housing prices have little purpose and may indeed be misleading. Likewise public policy based on erroneous data would be of little use. Drawing on the findings in this paper, in separate papers we have estimated an econometric model of house prices in Australia (Abelson, Joyeux, Milunovich and Chung, 2005) and reviewed the effects and public policy implications of taxation on house prices (Abelson, 2005).

In this paper we describe and assess the major sources of data on housing prices since 1970, estimate price series for the major cities and for Australia as a whole, and draw out the main findings about house and apartment (unit) prices. Section 2 describes the major data sources. Drawing on the preferred data sets, Section 3 provides our best estimates of median house and unit prices in the capital cities and in the rest of each state and the respective real price indices. We also estimate national Australian indices for house and unit prices. Section 4 estimates the effects of improvements in housing quality on house prices. Section 5 summarises our main findings.

---

[1] We use the term 'housing' to refer to all forms of dwellings, including houses and apartments.

2   Data Sources

In Australia in 2001, there were 7.1 million residential dwellings of which 75 per cent were separate houses, 13 per cent were units and 12 per cent were other forms of housing (terraces, semi-detached, town houses, etc.).[2] Most housing price data relate to houses; some to units; almost none to other dwellings. The main primary and secondary data sources are described below.

Primary sources

There are three main primary sources of data on housing prices:

- Government land title offices[3],

- The Real Estate Institute of Australia, and

- The Commonwealth Bank of Australia.

Land title offices (LTOs) in all states and territories receive data on all property transactions based on settlement dates and are the best primary source of property price data. However, the LTOs vary greatly in their analysis and distribution of price data. Only the NSW LTO regularly publishes summary statistics on housing prices (www.housing.nsw.gov.au), but it has done so for only a few years. Other LTO's can provide longer data series. The Victorian and South Australian LTOs can provide house price data from the early 1970s; the Northern Territory from 1980; Queensland from 1986; Western Australia from 1990.[4] However, most of these LTOs supply data to other parties only on a commercial and restricted basis. None publishes summary price statistics on a regular and timely basis. Also, there are few LTO-based statistics for unit prices or for non-capital city prices.

---

[2] Source: Australian Bureau of Statistics, 2001 Household Census.
[3] The location of the land title office varies according to the state or territory and may be in a Valuer-General Office, a Department of Land or Housing, or some other Department.
[4] We are not aware of any systematic analysis of ACT or Tasmanian land title data.

The second main source of primary data is the **Real Estate Institute of Australia** (REIA). The REIA has estimated median house and unit prices in most capital cities each quarter from 1980 and provides these estimates to its members and to others for non-commercial purposes. Before the September quarter 1998, these widely cited figures were based on sales that members reported to the state or territory branch of the REIA, again based on settlement dates. These sales were a large part of dwelling sales but not necessarily representative. However the bias, if any, in the data is not known. From September quarter 1998, the REIA has obtained data for NSW, Queensland, South Australian and Western Australia from LTOs. Thus, for these states, the REIA is no longer a separate primary source and its published series of dwelling prices is based on two different primary sources.[5]

Since 1984, the **Commonwealth Bank of Australia** (CBA) has estimated median house prices based on sales for which the bank provides finance in both capital cities and the rest of each state. Unlike the other two primary series, the prices are recorded when purchase is agreed rather than at settlement. The CBA figures are published regularly by the Housing Industry of Australia. However, because of the restricted and non-random nature of the data base, the sample is unlikely to be a representative set of houses. Doubtless for these reasons, CBA housing prices are often different from other price series (for detailed differences see Abelson and Chung, 2004).

From time to time, there are other primary sources of housing price data. A noteworthy example is the publication of the prices of auction sales in the 1960s and 1970s by some newspapers. Obviously these sale figures may be poor guides to housing price levels, but they may be fair gauges of changes in levels. However, they provided the basis of the major series of house prices estimated then by a consulting company (**Bis-Shrapnel**). The Commonwealth Treasury draws on them for part of its (unpublished) long-run quarterly house price series.

---

[5] Although now drawing on the same primary (LTO) data source for these states, REIA estimates of median house prices are not always the same as other estimates that draw on LTO data.

Peter Abelson and Demi Chung, Macquarie University

Secondary sources

The most important secondary source of data on house prices is the **Australian Bureau of Statistics** (ABS). The ABS has published estimated quarterly *indices* for house prices for eight capital cities separately and combined in a weighted series since 1986 (see *House Prices Indexes: Eight Capital Cities, Cat. No. 6416.0).*[6] However, the ABS does not publish actual house prices or any price information for units. For most cities, the ABS draws on a complete set of house transactions provided by LTOs. Where these data are not available, the ABS draws on REIA data.[7] Unlike most other agencies, the ABS makes a partial attempt to control for quality changes by stratifying houses by area within the city and in some cases also by house size (three or four bedrooms). For Sydney, Melbourne, Brisbane and Adelaide, the ABS estimates *median* prices for each area using a 'trimean' method and after excluding outliers.[8] For Perth, Hobart, Darwin and Canberra, the estimated average price is the *mean* of all sales in each area, excluding outliers. The Bureau then estimates a weighted average price for the cities (with weights reflecting the number of houses in each part of the sample) and the price movement between periods. However, the ABS does *not* control for improvements to housing in the form of alterations and additions, which are often substantial. The Bureau estimates the national capital city index by weighting the cities on the basis of finance commitments.

Some private firms or analysts also estimate housing prices usually drawing on LTO data. RBA (2004) cites two major current providers. Drawing on LTO data, **Residex** has reportedly estimated property prices indices for Brisbane, Melbourne and Sydney from 1978.[9] Residex attempts to exclude quality change effects by basing its indices only on prices changes

---

[6] The ABS (Cat. 6416.0) also provides indices for the costs of project homes. But these are construction costs, which exclude land values and landscaping costs.
[7] Correspondence with the ABS. The ABS did not indicate the cities for which it draws on REIA data.
[8] The trimean method involves estimating the median prices for three price groups (top, middle and bottom) and giving twice as much weight to the middle group.
[9] Our comments on Residex and APM draw on RBA (2004). Neither Residex nor APM responded to our requests to supply data for this paper.

between successive sales of the same property. However, this reduces the size of the sample and does not allow or alterations and additions. Also, the series is subject to revision as more properties are added to the series. **Australian Property Monitors** (APM) estimates prices for seven capitals drawing on data from LTOs, based on the date of contract rather than date of settlement. As far as we are aware, APM has not estimated a historical price series.

In an early study of house prices, Abelson (1982) reviewed all available data and estimated quarterly house prices in the capital cities in the 1970s. This drew on official and diverse other sources, including an obscure clerk in the tax office in Tasmania who was found to have assembled quarterly house price data for Hobart. This study is still the best source for 1970s data. In 1991, consultants Applied Economics and Travers Morgan produced a major review of house prices in Adelaide, Melbourne and Sydney, which drew on data from LTOs. Estimated median Adelaide and Melbourne prices were based on all sales. Sydney prices were estimated from a 10 per cent sampling exercise on the then manual data held by the NSW VG. This study remains the main source of information on house prices in Sydney to 1990.

In preparing its report on *First Home Ownership,* the Productivity Commission (2004) developed house price series from 1980 for most capital cities (from 1970 for Sydney and Melbourne), which drew on several of these sources. For recent years, it drew on LTO data for Sydney, Melbourne, Adelaide and Brisbane and on REIA data for Perth, Canberra, Darwin and Hobart. The Commission published the results in graphical rather than in numerical form but provided its data along with unpublished Australian Treasury house price data (see below) to the authors. The Commission did not estimate or cite unit prices.

Another significant house price series, albeit an unpublished one, is the Australian Treasury quarterly index for house prices in Australian capital cities from 1959-60 to the present. This index is a weighted figure based on house prices in Sydney, Melbourne, Brisbane, Adelaide, Perth and Canberra. This series is based entirely on secondary sources, namely ABS data

from December quarter 1985 to the present, on REIA data from 1980 to September quarter 1985, and on Bis-Shrapnel data back to 1960. This index is described and discussed further below.

In summary, there are far more price data for detached houses than for units. For some types of housing (for example semi-detached dwellings), there are no data. Most data relate to capital cities but there are some data for the rest of the states. Where they are available, LTO price data are to be preferred. However, availability varies by state. The REIA provides the longest continuous series back to 1980 (although it now draws on LTO data in four states) and the best price data for units. Only the CBA produces prices for new houses including land, but its database is likely to be biased. The ABS is the only agency that attempts to control for housing quality, but its control for quality is limited because the sample does not exclude alterations and additions which, as will be seen, substantially affect house prices. Also, the ABS publishes only nominal indices, not house prices.

3   Preferred Housing Price Series

In the appendix to a working paper, Abelson and Chung (2004) provide 44 tables that show in detail all the major data series that are available on house and unit prices in the capital cities and elsewhere from 1970 to 2003 from all major sources.[10] In this paper, we summarise the procedures for estimating the preferred house and unit price series and provide the main results along with the detailed assumptions.

Our procedure for estimating a preferred series is to select the best set of data and then to complete the gaps for the missing years, which almost always exist, in one of two ways. Where the price data from the second best source appear consistent with the *level* of prices in the preferred source (i.e. they are similar in the years closest to the missing years), we use

---

[10] We can provide these data electronically to readers on request (pabelson@efs.mq.edu.au).

these second source data as they stand unmodified to supplement those from our preferred source. Where the price levels of the two sources are inconsistent, we splice the data. We use the price levels shown in the preferred source, but extrapolate prices in the missing years by applying the estimated *percentage changes* in annual prices in the secondary source. In either case, the linking of the price series is based on judgement whether to apply price levels (which embody percentage changes) or simply the percentage changes in the secondary series rather than on a formal statistical process. In addition, where only estimated mean house prices are available, we convert these to estimated median prices, usually by discounting the mean prices by 8 to 9 per cent based on data on these differences from the original sources.

Wherever land title office data are available either from LTOs or from another source that draws on LTO data, we take these data as the benchmark. As shown in Abelson and Chung (2004), from 1990 to 2003 housing prices based on the REIA and CBA series tended to rise by more than prices derived from LTO data, especially in recent years. Adelaide was the only exception. We have no explanation for these differences. On the other hand, as would be expected, where comparisons are possible, the ABS house price indices generally rose by slightly less than the other housing price indices. An exception was Sydney where the ABS index rose by more than the LTO-based index but by less than the REIA and CBA indices. This suggests that the ABS is partially successful in discounting quality effects. However, the differences between the indices are usually small and, as discussed below, all reported house prices embody significant quality changes.

Our preferred best estimates of median house and unit prices for the capital cities and the rest of the states from 1970 to 2003 are shown below. Tables 1, 3 and 5 show estimated prices. Tables 2, 4 and 6 show the corresponding real price indices, with 1990 treated as 100.0. Footnotes to the tables detail the sources and assumptions on which the estimates are based. The prices and indices that draw largely on LTO data may be regarded as quite accurate measures although we have no measure of error. Thus the Victorian and South Australian data

can be regarded as quite reliable. Prices and indices that draw on other sources are likely to be less reliable. Data for Canberra, Darwin and Hobart are the least reliable.

The real price index figures for each city or state are obtained by deflating or inflating the prices (to a 1990 base) by the weighted consumer price index for all the capital cities. We estimate our Australian price indices for houses and units by weighting the estimated real indices according to the number of houses or units in each city as shown in the 1991 Household Census. For houses, the weights are Sydney (0.30), Melbourne (0.29), Brisbane (0.14), Adelaide (0.10), Perth (0.11), Hobart (0.02), Canberra (0.03) and Darwin (0.01).[11] When price data for some cities, usually the smaller ones, are not available from 1970-72, we re-weight the cities based on those cities for which data are available.[12] For units, the weight is much higher for Sydney (0.51). Melbourne (0.25) and Brisbane (0.10) also have significant weights. The other cities have very low weights for unit dwellings.

Table 2 also shows our estimated real annual Australian Treasury house price index. The Treasury index is a weighted average of prices in six cities: with weights drawn from the 14th CPI series namely Sydney (0.36), Melbourne (0.29), Brisbane (0.13), Adelaide (0.08), Perth (0.11) and Canberra (0.03). The annual index shown in Table 2 is the average quarterly Treasury figure converted into a real index with 1990 again = 100.

---

[11] Adopting a 2001 base, the weight of Sydney in the housing index would have fallen to 0.28 (due to low growth in detached housing in the 1990s), and the weights of Brisbane and Perth would have risen by one point each because of their higher population growth in the 1990s. Other city weights would have been unchanged.
[12] Also Darwin house prices were not available to 1985, but this has an insignificant effect on the adopted weights.

Table 1   **Annual median house prices ($) - capital cities**

Year	Sydney (a)	Melbourne (b)	Brisbane (c)	Adelaide (d)	Perth (e)	Hobart (f)	Darwin (g)	Canberra (h)
1970	18,700	12,800			17,500			
1971	21,200	13,400		11,900	17,750	11,875		18,000
1972	23,700	15,000		13,225	17,500	12,600		20,350
1973	27,400	19,800	17,500	16,250	18,850	15,200		26,850
1974	31,800	25,500	21,500	22,200	18,850	20,500		32,000
1975	34,300	28,700	23,700	26,150	24,500	25,850		33,600
1976	36,800	32,900	26,275	29,800	33,000	31,575		35,100
1977	39,200	37,000	28,600	32,600	36,400	34,500		36,700
1978	43,200	37,600	29,975	33,100	38,575	34,000		37,300
1979	50,700	38,000	31,450	33,750	38,600	34,750		39,000
1980	68,850	39,500	35,475	36,000	40,350	36,250		44,675
1981	78,900	44,000	45,325	39,100	43,825	37,100		57,750
1982	79,425	46,750	55,125	42,850	48,225	40.325		59,025
1983	81,425	52,500	55,525	47,950	49,000	42,500		68,150
1984	85,900	65,000	58,950	61,250	48,175	44,750		84,250
1985	88,350	75,200	61,550	72,200	52,050	55,500		90,625
1986	98,325	82,000	63,000	73,500	58,000	56,725	87,500	91,175
1987	120,025	89,500	63,500	74,500	61,225	63,450	81,075	90,125
1988	141,000	109,000	71,000	80,400	78,000	67,950	86,000	101,250
1989	170,850	132,000	96,000	90,400	102,500	77,325	90,750	115,000
1990	194,000	131,000	113,000	97,200	101,125	82,000	101,500	120,750
1991	182,000	127,000	120,000	103,900	99,500	89,650	111,550	136,500
1992	183,300	125,000	129,000	108,300	102,500	95,825	126,125	155,250
1993	188,000	126,000	136,500	111,200	112,750	104,250	150,500	159,375
1994	192,375	130,000	143,000	113,500	123,125	110,500	157,875	160,850
1995	196,750	129,000	147,000	111,500	126,788	106,750	165,375	155,550
1996	211,125	131,000	148,000	110,000	126,625	108,000	164,250	152,375
1997	233,250	142,000	150,000	113,500	134,125	108,750	176,500	152,750
1998	248,750	155,000	159,500	118,600	141,000	107,250	173,500	155,500
1999	272,500	175,000	161,000	127,000	147,500	112,225	179,375	161,500
2000	287,000	191,000	170,000	135,000	156,250	117,750	186,800	180,825
2001	322,500	225,000	178,700	150,000	168,375	120,575	188,000	206,250
2002	387,500	258,000	205,000	180,000	189,250	137,150	202,250	234,150
2003	454,250	276,000	249,000	225,000	205,000	172,500	211,333	293,667

Sources and notes:

(a) 1970-1989 prices are from Applied Economics (1991), with prices from 1980 to 1989 based on a 10 per cent sample of NSW VG data; 1990-94 prices are spliced using ABS data; 1995-2003 prices are from NSW VG / Department of Housing data.

(b) 1970-79 are unpublished Productivity Commission data based on VG data; 1980-2003 are Victorian VG data.

(c) 1973-79 are mean prices from Abelson (1982) factored down by 8% to fit REIA median data in 1980 and 1981; 1980-85, REIA data; 1986-2003, Queensland VG data.

(d) 1971-79 are mean values from Abelson (1982) obtained from SA VG reduced by 8% for medians; 1980-2003 are from SA VG.

(e) 1970-89, based on REIA data. 1990-2003, average of quarterly data from the Department of Land.

(f) 1971-81 are mean values (Abelson, 1982) reduced by 8%; 1982-83 are interpolated; 1984-90, CBA data spliced to 1991-2003 average quarterly REIA data..

(g) Average of quarterly medians from REIA.

(h) 1971-80 are mean values from Abelson (1982) reduced by 9% for medians; 1981-2003 are average of quarterly REIA medians.

Table 2 **Real annual house price indices - capital cities (1990 = 100)**

Year	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra	AC(a)	Australia Treasury
1970	56.6	57.4			101.6				64.0	58.8
1971	60.5	56.7		67.8	97.2			82.6	65.7	61.2
1972	63.8	59.8		71.1	90.4	80.3		88.0	68.0	64.2
1973	67.5	72.3	74.1	79.9	89.1	88.6		106.3	75.1	70.4
1974	68.0	80.7	78.9	94.7	77.3	103.7		109.9	79.0	75.0
1975	63.7	78.9	75.5	96.9	87.2	113.5		100.2	77.9	70.9
1976	60.3	79.8	73.9	97.4	103.7	122.3		92.9	78.7	70.2
1977	57.2	79.9	71.6	94.9	101.8	119.0		86.0	76.7	69.4
1978	58.3	75.2	69.5	89.2	100.0	108.6		80.9	74.3	68.9
1979	62.8	69.7	66.9	83.4	91.7	101.8		77.6	71.9	70.5
1980	77.4	65.7	68.4	80.7	87.0	96.4		80.7	74.6	78.5
1981	80.9	66.8	79.8	80.0	86.2	90.0		95.1	77.8	83.4
1982	73.2	63.8	87.2	78.8	85.3	87.9		87.4	75.1	78.9
1983	68.2	65.1	79.8	80.2	78.7	84.2		91.7	72.3	75.6
1984	69.2	77.6	81.6	98.5	74.5	85.3		109.1	78.5	78.9
1985	66,7	84.1	79.8	108.8	75.4	99.1		109.9	80.8	81.2
1986	68.0	84.0	74.9	101.5	77.0	92.9	115.7	101.4	79.9	80.3
1987	76.6	84.5	69.5	94.8	74.9	95.8	98.8	92.4	80.6	77.8
1988	83.9	96.0	72.5	95.4	89.0	95.9	97.8	96.7	88.3	88.6
1989	94.5	108.1	91.1	99.8	108.7	101.1	95.9	102.2	100.4	104.4
1990	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1991	90.9	93.9	102.9	103.6	95.3	103.2	106.5	109.5	96.2	98.0
1992	90.6	91.5	109.5	106.9	97.2	109.3	119.2	123.3	97.5	97.6
1993	91.3	90.6	113.8	107.8	105.1	116.8	139.7	124.4	99.4	97.8
1994	91.7	91.8	117.0	108.0	112.6	121.5	143.8	123.2	101.2	100.2
1995	89.6	87.0	115.0	101.4	110.8	112.1	144.0	113.8	97.6	99.2
1996	93.7	86.1	112.8	97.5	107.8	110.6	139.4	108.7	97.4	98.1
1997	103.3	93.1	114.0	100.3	113.9	111.1	149.4	108.7	103.5	100.3
1998	109.2	100.8	120.2	103.9	118.8	108.6	145.6	109.7	109.2	106.3
1999	117.9	112.1	119.6	109.7	122.4	112.0	148.4	112.3	116.2	112.8
2000	118.9	117.2	120.9	111.6	124.2	112.5	147.9	120.3	118.7	118.5
2001	128.0	132.2	121.7	118.8	128.2	110.3	142.6	131.5	127.3	127.1
2002	149.3	147.2	135.6	138.4	139.9	121.8	148.9	144.9	144.0	146.7
2003	170.3	153.2	160.2	168.3	147.4	149.1	151.4	176.9	165.9	163.2
Index in 2003 1973 = 100	252.3	211.9	216.2	210.7	165.4	168.3	na	166.4	220.9	231.8

(a) Abelson-Chung index with 1991 Census data on houses used for weights and using data for cities as available (see text).

Sources: Table 1 deflated using the consumer price index.

Table 3   Annual median unit prices ($) - capital cities

Year	Sydney (a)	Melbourne (b)	Brisbane (c)	Adelaide (d)	Perth (c)	Hobart (c)	Darwin (c	Canberra (c)
1970	13,490							
1971	15,127							
1972	17,363							
1973	20,145							
1974	24,981	23,300		23,113				
1975	26,470	25,675		24,345				
1976	28,400	29,625		29,599				
1977	30,600	32,050		31,537				
1978	33,000	33,050		30,750				
1979	40,400	31,500		31,979				
1980	56,500	33,000	37,379	31,997	35,825			33,867
1981	67,300	36,500	48,308	34,334	36,004			43,963
1982	70,200	38,500	48,471	38,887	38,958			42,833
1983	66,000	42,500	54,396	45,213	40,729			50,358
1984	67,800	52,500	58,738	56,238	37,467	40,200		59,833
1985	70,500	60,000	55,446	61,600	40,033	47,750		72,604
1986	72,300	66,750	60,508	65,400	44,042	62,100		84,333
1987	86,200	72,250	61,146	64,200	48,263	59,908		76,688
1988	118,400	85,000	68,875	67,000	57,417	60,896		84,667
1989	138,525	104,500	85,604	72,900	75,917	73,833		91,313
1990	135,715	115,000	91,375	81,300	75,625	71,208		96,979
1991	139,285	108,500	93,875	86,000	75,500	72,775		104,083
1992	140,280	110,000	98,896	89,600	76,267	76,817		128,125
1993	142,760	110,000	101,688	91,400	79,492	80,771		130,583
1994	156,075	115,000	103,583	96,000	86,200	84,542		129,083
1995	173,625	115,000	107,358	94,100	87,096	88,292		122,542
1996	186,250	115,000	127,583	89,000	87,525	84,404		122,083
1997	214,250	127,000	128,125	89,300	92,813	77,375	131,667	122,333
1998	228,375	140,000	145,333	91,100	98,473	79,017	127,167	128,500
1999	243,375	170,075	139,000	94,100	107,075	85,500	155,550	131,125
2000	256,250	184,000	171,500	99,300	114,275	88,850	146,550	140,250
2001	291,250	215,388	165,475	112,200	123,575	88,525	149,750	156,875
2002	329,500	240,075	173,775	138,300	142,150	95,625	154,750	197,750
2003	360,000	269,000	201,833	159,700	160,467	126,200	153,167	253,533

Sources and notes

(a)   1970-1988 are Applied Economics (1991) data based on VG data; 1989-94 are average of REIA and CBA figures; 1995-2003 are VG data.

(b)   1974-89 are based on VG data (Applied Economics, 1991); 1990-2003 are VG data.

(c)   Average of quarterly data from REIA.

(d)   1974-84 are based on mean values from VG data (Applied Economics, 1991); 1985-03 are medians from VG.

Table 4   Real annual unit price indices - capital cities except Darwin (1990 = 100)

Year	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Canberra	Australia (a)
1970	58.4							
1971	61.7							
1972	66.8							
1973	71.0							
1974	76.3	84.0		117.9				81.4
1975	70.2	80.4		107.8				75.8
1976	66.5	81.8		115.7				74.4
1977	63.8	78.8		109.7				71.4
1978	63.7	75.3		99.1				69.5
1979	71.5	65.8		94.5				71.3
1980	90.8	62.6	89.2	85.8	103.3		76.1	83.1
1981	98.6	63.1	105.2	84.0	94.7		90.2	88.5
1982	92.5	59.9	94.9	85.5	92.1		79.0	83.3
1983	79.0	60.0	96.7	90.4	87.5		84.4	76.7
1984	78.1	71.4	100.5	108.1	77.4	88.3	96.4	81.0
1985	76.1	76.4	88.9	111.0	77.5	98.2	109.6	80.5
1986	71.5	77.9	88.9	108.0	78.2	117.1	116.7	78.7
1987	78.6	77.7	82.8	97.7	79.0	104.1	97.9	80.6
1988	100.7	85.3	87.0	95.1	87.6	98.7	100.7	94.5
1989	109.5	97.5	100.5	96.2	107.7	111.2	101.0	104.7
1990	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
1991	99.4	91.4	99.5	102.5	96.7	99.0	104.0	97.6
1992	99.2	91.8	103.8	105.7	96.7	103.5	126.7	98.7
1993	99.1	90.1	104.9	105.9	99.0	106.9	126.9	98.6
1994	106.3	92.5	104.8	109.2	105.4	109.8	123.1	103.3
1995	113.1	88.4	103.8	102.3	101.8	109.6	111.7	104.8
1996	118.2	86.1	120.2	94.3	99.7	102.1	108.4	107.8
1997	135.6	94.9	120.5	94.4	105.4	93.3	108.4	119.1
1998	143.3	103.7	135.5	95.4	110.9	94.5	112.9	127.1
1999	150.5	124.2	127.7	97.2	118.9	100.8	113.5	135.6
2000	151.7	128.6	150.8	98.1	121.4	100.3	116.2	139.8
2001	165.2	144.2	139.4	106.2	125.8	95.7	124.5	150.2
2002	181.5	156.0	142.1	127.1	140.5	100.4	152.4	164.3
2003	192.9	170.1	160.6	142.9	154.3	128.9	190.1	178.2
Index in 2003: 1974 = 100	252.8	202.5	na	121.2	na	na	Na	219.0

(a) Abelson-Chung index with 1991 Census data on units used for weights and using data for cities as available (see text).

Sources: Table 3 deflated using the consumer price index.

Table 5 Annual median prices ($) - rest of the states

Year	NSW Houses (a)	Victoria houses (b)	Victoria units	Queensland houses (c)	S.Australia houses (d)	S.Australia units	W.Australia houses (e)	Tasmania Houses (f)
1985	70,175	50,000	51,500		48,800	52,000	52,325	49,450
1986	67,500	55,500	57,000	55,000	52,200	60,700	52,800	57,025
1987	71,550	60,000	59,950	57,500	51,900	65,000	58,200	57,450
1988	81,975	67,000	65,000	65,000	56,900	59,800	63,025	61,700
1989	96,375	77,000	74,000	80,000	58,700	60,300	74,175	67,075
1990	107,525	80,000	78,500	88,000	63,100	64,600	77,425	74,600
1991	115,825	80,000	80,000	94,900	66,400	72,500	82,500	76,925
1992	120,025	82,000	80,800	101,500	68,000	72,000	84,100	82,475
1993	119,175	83,500	80,000	112,000	72,800	73,900	89,925	85,950
1994	126,275	86,000	82,350	120,000	77,700	78,700	100,050	91,950
1995	131,625	85,000	83,000	127,000	81,300	75,700	112,850	96,450
1996	136,225	85,500	82,000	127,000	81,800	81,900	123,425	97,675
1997	143,375	88,000	80,000	128,000	84,000	83,300	134,725	105,450
1998	154,675	91,000	83,000	134,000	85,600	83,700	139,250	106,600
1999	170,150	100,000	88,500	135,000	90,200	84,700	148,975	106,475
2000	164,775	105,000	96,600	140,000	91,300	90,300	148,250	101,525
2001	169,900	121,000	105,000	138,000	99,300	89,100	149,650	99,525
2002	209,725	144,000	122,250	151,000	117,800	107,400	174,400	109,225
2003	273,200	177,120	150,368	175,000	135,800	126,500	203,967	147,067

(a)   Rest of New South Wales. Average of quarterly data from CBA/HIA.
(b)   Victoria country; VG data. 2003 = 2002 factored up by increase shown in CBA figures.
(c)   Rest of Queensland. Average of quarterly (fiscal year, not calendar year) data from VG.
(d)   Non-metro in South Australia; VG data.
(e)   Rest of Western Australia; Average of quarterly data from CBA/HIA.
(f)   Rest of Tasmania; Average of quarterly data from CBA/HIA.

Table 6 Real annual median price indices - rest of the states

Year	NSW Houses	Victoria houses	Victoria units	Queensland Houses	S.Australia houses	S.Australia units	W.Australia houses	Tasmania Houses	Australia (a) Houses
1985	95.6	91.5	96.1		113.3	117.9	99.0	97.1	96.0
1986	84.3	93.1	97.5	83.9	111.1	126.1	91.6	102.6	89.1
1987	82.3	92.8	94.5	80.9	101.8	124.5	93.0	95.3	86.8
1988	88.0	96.6	95.5	85.2	104.0	106.8	93.9	95.4	90.9
1989	96.2	103.3	101.1	97.5	99.8	100.1	102.8	96.5	98.7
1990	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1991	104.4	96.9	98.7	104.5	101.9	108.7	103.2	99.9	102.3
1992	107.1	98.3	98.7	110.6	103.4	106.9	104.2	106.1	105.6
1993	104.4	98.3	96.0	119.9	108.7	107.8	109.4	108.6	107.7
1994	108.6	99.4	97.0	126.1	113.9	112.7	119.5	114.0	112.2
1995	108.2	93.9	93.4	127.5	113.9	103.6	128.8	114.3	111.9
1996	109.1	92.0	90.0	124.3	111.6	109.2	137.3	112.8	111.5
1997	114.6	94.5	87.5	125.0	114.4	110.8	149.5	121.4	115.6
1998	122.5	96.9	90.1	129.7	115.6	110.4	153.2	121.7	120.5
1999	132.8	104.9	94.6	128.8	120.0	110.1	161.5	119.8	126.5
2000	123.1	105.5	98.9	127.8	116.3	112.3	153.9	109.4	121.6
2001	121.6	116.4	103.0	120.7	121.1	106.2	148.8	102.7	121.2
2002	145.8	134.5	116.4	128.2	139.5	124.3	168.3	109.4	138.5
2003	184.8	161.0	139.3	144.6	156.5	142.4	191.6	143.4	166.7

(a)   Abelson-Chung index with 1991 Census data on dwellings used for weights.

4   Effects of Housing Quality

House prices are actually housing expenditures. Thus

$$P^h = \sum p_i q_i \tag{1}$$

where P^h is house price, there are i attributes of a house, and p and q stand for the price and quantity of the attributes. Clearly house prices may rise because the quality or quantity of attributes rises, with no rise in the prices of the attributes. The attributes of houses include house size, garages and swimming pools, central heating and air conditioning, kitchens of various qualities, and so on. Generally the quantity of the attributes (i.e. the quality of dwellings) rises over time. For example, the size of new homes has increased over many years by about 1.8 cent per annum. Between 1984-85 and 2002-03, the average floor area of new houses in Australia rose by 40 per cent (from 162 m^2 to 227.3 m^2) and the average floor area of other new dwellings rose by 35 per cent (from 99.2 m^2 to 134 m^2).[13]

As we have seen, the ABS attempts to control for quality changes by stratifying houses by area within a city and also by size (number of bedrooms) in some cities. However, this does not allow for changes in the physical or locational attributes of particular properties. Physical attributes reflect home improvements. Locational attributes reflect neighbourhood or infrastructure improvements.

Of special interest here are improvements to existing dwellings that make up 98 per cent of the housing stock at any point in time. In addition to repairs and maintenance to dwellings to maintain housing quality, households spend regularly about 2 per cent of GDP on dwelling improvements (alterations and additions) – see Table 7. Indeed in 2001-02 and 2002-03, expenditure on alterations and additions has risen and averaged 2.5 per cent of GDP.

---

[13] Source: ABS, Building Approvals, Cat. No. 8731.0.

Table 7 (column 4) also provides estimates of annual expenditure on dwelling improvements in relation to the value of the dwelling stock at the end of the financial year. Our estimates of the value of the dwelling stock are based on our estimates of the value of the stock of houses, units and other dwellings in each state in June 1991(based on the stock shown in the 1991 Household Census). We inflated the estimated median values for each housing type by 9 per cent to reflect typical differences between mean and median values. The estimated values for the housing stock in other years allow for an average 1.75 per cent change in the quantity of the stock each year as well as for estimated changes in nominal dwelling prices. For the 24 years, 1979-80 to 2002-03, we estimate that expenditure on alterations and additions averaged 1.02 per cent of the value of the housing stock.

Table 7   **Value of dwellings and expenditure on alterations and additions (AA)**

	Estimated value of housing stock at 30 June ($bn)	Expenditure on alterations and additions ($bn)	Expenditure on AA as % of value of housing	GDP ($bn)	Value of dwellings % of GDP	Expenditure on AA as % of GDP
1979-80	219	2.4	1.07	128.8	169.8	1.8
1980-81	255	3.0	1.18	145.9	174.7	2.1
1981-82	280	3.4	1.21	167.7	167.2	2.0
1982-83	303	3.3	1.09	180.8	167.5	1.8
1983-84	346	3.6	1.04	203.7	170.0	1.8
1984-85	391	4.2	1.07	225.4	173.5	1.9
1985-86	426	4.8	1.13	248.6	171.3	1.9
1986-87	474	4.9	1.03	272.3	174.2	1.8
1987-88	604	5.3	0.88	310.6	194.6	1.7
1988-89	734	6.3	0.86	351.9	208.5	1.8
1989-90	767	7.4	0.97	385.0	199.2	1.9
1990-91	775	7.5	0.97	397.9	194.8	1.9
1991-92	807	7.5	0.93	404.6	199.5	1.9
1992-93	852	8.3	0.97	426.2	200.0	1.9
1993-94	900	9.2	1.02	447.0	201.3	2.1
1994-95	924	10.3	1.11	471.3	196.0	2.2
1995-96	963	10.2	1.06	502.8	191.5	2.0
1996-97	1043	10.2	0.98	529.9	196.9	1.9
1997-98	1130	11.7	1.04	561.2	201.3	2.1
1998-99	1243	12.7	1.02	591.9	210.0	2.1
1999-2000	1348	15.2	1.13	626.0	215.3	2.4
2000-01	1535	14.3	0.93	671.1	228.7	2.1
2001-02	1820	16.8	0.92	714.4	254.7	2.4
2002-03	2193	19.9	0.91	753.2	291.1	2.6

Sources: ABS, Cat. 5204.0. Value of housing stock estimated – see text.

We conclude that the quality of the established housing stock rises by at least 1 per cent per annum on average. Expenditure on alterations and additions does not include expenditure on fittings (which tend to improve) or any non-market household or black economy time spent on maintaining or improving dwellings. As noted, the size of new buildings is increasing by nearly 2 per cent per annum, but this is only a small part of the housing stock at any point in time. Moreover, although expenditure on alterations and additions varies a little in relation to GDP, the relationship is remarkably steady except for the most recent years. It might be expected that expenditure on alterations and additions is disproportionately on houses rather than on units, which are less amenable to alterations, but we have no evidence on this.

Estimating constant quality Australian real house price indices

Table 8 shows our estimated constant quality real price indices for all Australian houses and units. The AC indices are the Abelson-Chung real price indices for houses and units across Australia shown in Tables 2 and 4 respectively. The AT index is the estimated Australian Treasury real price index for Australian houses (from Table 2). To estimate the respective constant quality (CQ) indices, we assume that the quality change in each calendar year equals the expenditure on alterations as a percentage of housing value in the immediately preceding financial year (as per column 4 in Table 7). For example in 1991, there was 0.97 per cent improvement in quality compared with 1990. To allow for this we multiply the AC real house price index in 1991 by 99.03 (= 100.0 – 0.97) and obtain a constant quality index number of 95.3. Of course, this value effect compounds each year. We adopt a similar procedure to estimate a constant quality Treasury real house price index and an Abelson-Chung constant quality real unit price index.

As noted, there may be proportionately more improvements in housing than in units, but we have no differentiating data. On the other hand, median unit prices may have more locational bias over time as a large number of units have been built in or close to CBDs in recent years.

Table 8   Estimated national constant quality real housing indexes (a)

Year	Houses AC[a]	Houses ACCQ[b]	Houses AT[c]	Houses ATCQ[b]	Units AC[d]	Units ACCQ[b]
1980	74.6	82.8	78.5	87.1	83.1	92.2
1981	77.8	85.3	83.4	91.5	88.5	97.1
1982	75.1	81.4	78.9	85.5	83.3	90.3
1983	72.3	77.5	75.6	81.0	76.7	82.2
1984	78.5	83.3	78.9	83.7	81	85.9
1985	80.8	84.8	81.2	85.2	80.5	84.5
1986	79.9	82.9	80.3	83.3	78.7	81.7
1987	80.6	82.8	77.8	79.9	80.6	82.8
1988	88.3	89.9	88.6	90.2	94.5	96.2
1989	100.4	101.4	104.4	105.4	104.7	105.7
1990	100.0	100.0	100.0	100.0	100	100.0
1991	96.2	95.3	98.0	97.1	97.6	96.7
1992	97.5	95.7	97.6	95.8	98.7	96.9
1993	99.4	96.6	97.8	95.0	98.6	95.8
1994	101.2	97.4	100.2	96.4	103.3	99.4
1995	97.6	92.9	99.2	94.4	104.8	99.7
1996	97.4	91.7	98.1	92.4	107.8	101.5
1997	103.5	96.5	100.3	93.5	119.1	111.0
1998	109.2	100.8	106.3	98.1	127.1	117.3
1999	116.2	106.1	112.8	103.0	135.6	123.9
2000	118.7	107.2	118.5	107.0	139.8	126.3
2001	127.3	113.9	127.1	113.7	150.2	134.4
2002	144.0	127.7	146.7	130.1	164.3	145.7
2003	165.9	145.8	163.2	143.4	178.2	156.6

(a) Abelson-Chung Australian real house price index from Table 2.
(b) CQ stands for constant quality.
(c) Australian Treasury Australian real house price index from Table 2.
(d) Abelson-Chung real unit price index from Table 4.

Estimating constant quality real house price indices for the capital cities

We also examine briefly the effects of allowing for quality changes in the capital cities. Table 9 shows the proportion of dwellings in each state and the percentage of expenditure on alterations and additions in each state in the calendar years 2001 and 2002. The table shows that expenditure on alterations and additions in these years approximately matched the proportion of dwellings in each state. In relation to dwellings, expenditure on alterations was slightly high in Queensland and Victoria and low in NSW, South Australian and Tasmania.

Table 9   Allocation of expenditure on alterations and additions

State / Territory	Percentage of dwellings	Percentage of expenditure on AA 2001	2002
NSW	33	30	31
Victoria	25	28	26
Queensland	19	22	24
S. Australia	8	6	6
W. Australia	10	10	9
Tasmania	3	1	1
ACT	2	2	2
N. Territory	1	1	1
Total	100	100	100

Sources: ABS, Cat. 5204.0 and 2001 Household Census.

However, we have not pursued these possible interstate differences further in part because we are mainly interested in capital city prices rather than state-wide prices and data on improvements by city are not readily available. In Table 10 we provide estimates of constant quality real house price indices for each capital city for 1980 and 2003, holding quality constant at 1990 levels and continuing to base the index on 1990 = 100.0. We assume constant quality changes across Australia. Consistent with the pattern for Australia-wide expenditures on alterations and additions, our estimates assume that alterations and additions accounted for an average 1.04 per cent per annum increase in the median value of houses in each city between 1980 and 1990 and an average 1.00 per cent per anum increase in value between 1990 and 2002. Allowing for compounding, this implies that the quality of the median house in 1990 was 10.9 per cent higher than the quality in 1980 and that quality of the median house in 2003 was in turn 13.8 per cent higher than in 1990. To estimate a constant quality house price index over the period, we multiply the 1980 real price index by 1.109 and the 2003 real price index by 0.879 (1.0 / 1.138). This significantly reduces the real increases in house prices. Nevertheless, there remained substantial real house price increases in all cities over this period.

Table 10   Real annual house price indices – selected years in capital cities (1990 = 100)

Year	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra	AC	Australia Treasury
Real price indices from Table 2										
1980	77.4	65.7	68.4	80.7	87.0	96.4		80.7	74.6	78.5
1990	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2003	170.3	153.2	160.2	168.3	147.4	149.1	151.4	176.9	165.9	163.2
Constant quality price indices										
1980	85.8	72.9	75.9	89.5	96.5	106.9	na	89.5	82.5	87.1
1990	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2003	149.6	134.7	140.8	147.9	129.6	131.1	133.1	155.5	145.8	143.4

Sources: Table 2 and our estimates of quality adjusted indices (see text).

5   Housing Prices: Main Findings

House prices in capital cities

In Table 2 (and in Figure 1) we show the Abelson-Chung and Australian Treasury real house price indices for Australian capital cities, with no allowance for alterations and additions. The indices are similar, especially since the mid-1980s. The correlation is 0.995 for the period from 1986 to 2003 but only 0.774 for 1970 to 1985.[14] The Abelson-Chung index has a slightly higher price spike in 1974-75 and a slightly smaller one in 1980-81. As we have noted, the two series use slightly different databases as well as different weights, with the Treasury giving more weight to Sydney houses. We have not seen the 1970s' house price data on which the Treasury index is based and so cannot explain the differences in that decade.

Both national indices show significant house price booms from 1971 to 1974, from 1979 to 1981, from 1987 to 1989, and from 1996 through to 2003 (much the most prolonged price boom). After each of the first three booms, real prices tended to fall. However, in the long run real price rises exceeded falls. Real house prices rose by about 160 per cent between 1970 and 2003. However this could be a misleading estimate of the real long-term house price increase if there is a downturn in real house prices after the 1996-2003 boom.[15]

---

[14] The correlation for the whole period 1970 to 2003 is 0.99.

[15] To avoid trough to peak comparisons, the Productivity Commission (2004) estimated time trend growth rates which provide lower long-term annual growth rates.

Figure 1

Housing prices real indices: 1970-2003
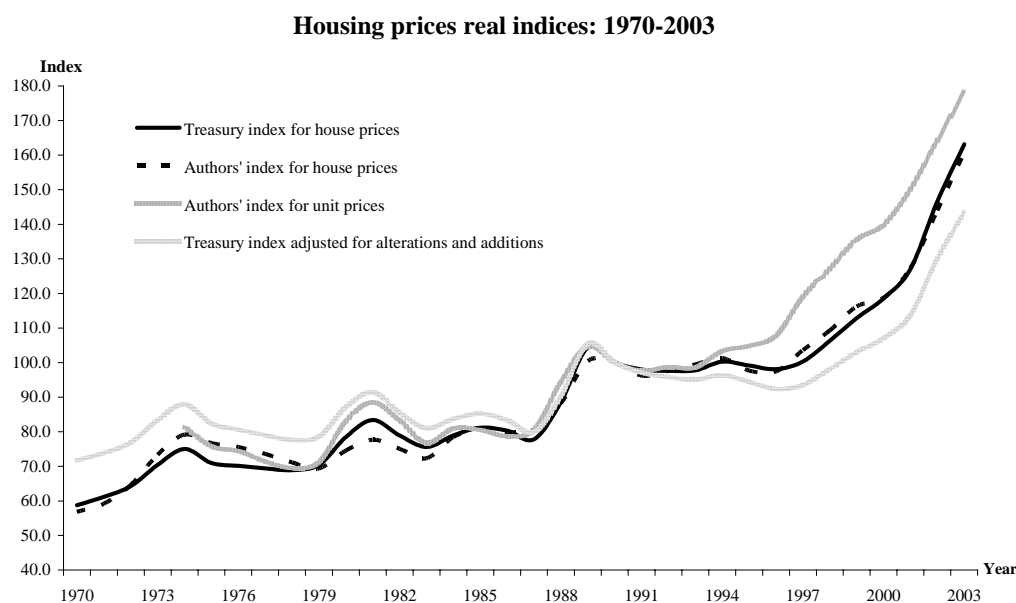
The 160 per cent real house price increase over 30 years places Australia close to the top of the OECD league for house price increases. As reported by Tsatsaronis and Zhu (2004), who analyse international house prices also from 1970 to 2003, only the UK, Spain and Netherlands experienced real house price increases of a similar magnitude over this period. Real house price increases in most other OECD countries ranged over this period from minus 10 per cent to plus 100 per cent.

In Figure 1, we also show our estimated constant quality Australian Treasury real housing price index from Table 8. This is based on the figures in Table 8 (column 5) back to 1980 and an assumed one per cent per annum quality improvement in the 1970s. On this basis, in constant quality terms real house prices would have risen by 100 per cent between 1970 and 2003 (rather than by 160 per cent). Again, a caveat must be made about end-year to end-year comparisons.

It may also be observed that, whether using the actual 160 per cent increase in real house prices or the 100 per cent constant quality adjusted increase, these real price increases were well above the approximately 50 per cent increase in real disposable income per capita that occurred over this 30 year period. There is no simple relationship between house prices and per capita disposable income because the housing market is not always in equilibrium and the real cost of housing is also determined by real interest rates as well as by other factors. In an econometric study of real house prices (not quality adjusted), which accounted for disequilibrium and interest rates, Abelson, Joyeux, Milunovich and Chung (2005) estimated that the elasticity of long-run elasticity of real house prices is 1.7 with respect to real disposable income per capita.

Contrary to some popular views, cities have generally experienced similar changes in house prices, especially in recent years. Between 1990 and 2003, ignoring alterations and additions, real house prices rose between 47 per cent and 77 per cent in all cities, compared with an Australian figure of about 64 per cent. Even over a longer period, the major cities exhibited similar price movements. From between 1970 and 1973 (depending on data availability) to 2003, the following house price correlations are observed: Sydney-Melbourne (0.925); Sydney-Brisbane (0.916); Melbourne-Adelaide (0.921), Melbourne-Perth (0.811).

However, the smaller and more outlying cities deviated more from the norms. For example, house prices in Perth fell in real terms in the 1971 to 1974 house price boom, possibly because Perth experienced an earlier real increase with the 1969-71 stock mining boom in the West. Canberra experienced major house price booms after Labor party general election wins in 1972 and 1983 (the latter boom a departure from national trends). Also real house prices in Perth, Hobart and Canberra rose in the early 1990s when real prices in other cities were falling.

Unit prices in capital cities

House and unit prices also exhibited similar trends (see Figure 1). The unit price index rose slightly more in recent years due to the high weighting of Sydney in the unit index (and possibly because of the construction of units in and close to city centres). Real unit prices boomed between 1978 and 1981, 1986 and 1990, and from 1993 though to 2003.[16] There was a high correlation (0.982) between our Australian house and unit price indices from 1974 to 2003. High correlations can also be observed between house and unit prices *within* Sydney and *within* Melbourne. Such high correlations would not necessarily be expected. Compared with units, houses usually contain a high proportion of land value and a low proportion of built value. Usually land value appreciates more than built value which should not increase faster than the CPI unless building productivity is lagging. Also the supply of units is more elastic than the supply of houses.

Furthermore, unit prices in the major cities moved in broadly similar ways. The correlations between Sydney and Melbourne unit prices from 1974 to 2003 and between Sydney and Brisbane prices from 1980 to 2003 were 0.893 and 0.942 respectively.

Rest of Australia

In recent years house prices in the rest of Australia have risen in a remarkably similar way to those in cities. Between 1990 and 2003, real prices in the rest of Australia rose by an estimated average of 67 per cent compared with real prices in the cities that rose by an estimated average of 63 per cent. Again the main movements in prices were similar over time. Also, prices rose in broadly similar ways in all states, though slightly more in NSW, Victoria and Western Australia than in South Australia, Queensland and Tasmania.

---

[16] Real unit prices also boomed in Sydney in the early 1970s (we do not have data for other cities in this time).

6 Conclusions

In this paper we have attempted to provide an authoritative account of housing prices in Australia from 1970 to 2003. We have drawn where possible on data from land title offices around Australia and supplemented these data as required from other sources.

A feature of the findings is the strong national trends. Price changes in the major cities were quite highly correlated especially over the last 15 or so years. Also unit prices in cities were highly correlated with house prices in cities and house price movements outside cities have reflected price movements in cities in recent years.

There were significant house price booms in most of Australia from 1971 to 1974, from 1979 to 1981, from 1987 to 1989, and from 1996 through to 2003. After each of the first three booms, real prices tended to fall. However in the long run, our estimated national index for real house prices in Australian cities rose by about 160 per cent between 1970 and 2003. This real price increase was at the top end of real price increases for houses observed in OECD countries over this period.

Housing improvements accounted for a significant part of these real prices. We estimate that constant quality national index for real house prices in Australia cities increased by about 100 per cent over this same 33-year period. Of course, both estimates of real house price increases (without and with quality adjustments) give an exaggerated picture of real price increases if there is a real house price downturn post 2003 as there was after previous house price booms.

References

Abelson, P., 1982, *Models of Short Term Movements in House Prices*, 52nd ANZAAS Congress.

Abelson, P., 2005, 'Taxation and House Prices', Macquarie University Economics Research Paper, forthcoming.

Abelson, P. and Chung, D., 2004, 'Housing Prices in Australia: 1970 to 2003', *Macquarie Economics Research Papers*, No. 9/2004, September 2004.

Abelson P., Joyeux, R., Milunovich, G. and D.Chung,, 2005, 'Explaining House Prices in Australia: 1970 to 2003', *Economic Record*, forthcoming.

Applied Economics and Travers Morgan, 1991, *Housing Costs Study Volume 3, Determinants of the Prices of Established Housing*, Australian Building Research Grants Scheme, Canberra.

Productivity Commission, 2004, *First Home Ownership*, Report no. 28, Melbourne.

Reserve Bank of Australia, 2004, 'Measuring Housing Prices', *Reserve Bank of Australia Bulletin,* July, pp.1-9.

Tsatsaronis, K., and H.Zhu, 2004, 'What drives housing price dynamics: cross-country evidence', *BIS Quarterly Review*, 65-78.