# House Prices – Drivers and Links to the Broader Economy: Rational or Irrational Exuberance

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Shann Memorial Lecture
University of Western Australia
August 2005

I would like to thank Jeff Oughton and other members of the National's Economics Team for helpful comments. Beyond that a particular vote of thanks goes to John Sharma whose work lies behind much of the house price model and who also provided invaluable econometric support. That said, any remaining errors are mine. Also, the views expressed are the author's and do not necessarily reflect those of the National Australia Group.

**Introductory Comments**

There is little doubt that over the 15 years or so that I have been a private sector economist, the subject of house prices (and, in particular, their future direction) has always attracted a great deal of attention from audiences that I have addressed. If I can start by way of an understatement, nothing much has changed in the past few years. Indeed, the public debate that has raged about the ramifications of higher house prices in Australia – and indeed the Anglo Saxon world more generally – has produced some very colourful descriptions of "bubbles" and debate about whether or not "it will all end in tears".

At one end of the spectrum is the "Economist" magazine which has consistently and colourfully argued, amongst other things that:

- "Australia's housing market could be as much a victim of irrational exuberance as America's stock-market has been" (March 2003);

- "inflated house prices pose an even bigger risk to the world economy than oil" (June 2004); and, most recently

- "the world rise in house prices is the biggest bubble in history. Prepare for the economic pain when it pops" (June 2005)[1]

While no-where near as sensationalist, concerns have also from time to time been expressed by members of the Australian official family. Thus the Secretary of Treasury Ken Henry in 2003 ("off the record") talked about the Australian property market as a "bubble", while the Governor of the Reserve Bank, Ian Macfarlane, has in numerous public offerings expressed his concern about the sustainability of the housing market – especially, in the period 2003-2004.

Not surprisingly, such talk has had significant impacts on public perceptions. Thus, for example, since late 2003 we at the National Australia Bank Ltd (NAB) have asked a question in our Quarterly Business Survey about whether or not "a residential property price bubble exists in Australia". As shown below, in late 2003, 76 percent of respondents answered yes. Also, interestingly, that dire expectation has progressively eroded – and today more respondents answer "no" than "yes".


Source: NAB

By engineering significant changes in public perceptions policy makers can, in certain circumstances, set in place powerful expectational effects. I, for one, would argue that the Reserve Bank of Australia has been quite successful in talking up the risks of both the potential for house price falls and interest rate increases. That has, in effect, by changing public perceptions been used as an alternative for actually tightening policy significantly (and

hence risking a potentially much rockier outcome). To some extent the approach could be summarised as "watch my words not my actions" - or in the recent UK parlance, the "Maradona" approach to monetary policy.[2]

As an economist working for an institution in which around half its balance sheet is directly exposed to housing you might not be surprised to learn that we, at the National, have spent a good deal of time trying to better understand the linkages between house prices, the robustness of households balance sheets, consumer demand for credit and actual consumer spending - a topic which the Reserve Bank is also maintaining a close interest.[3]

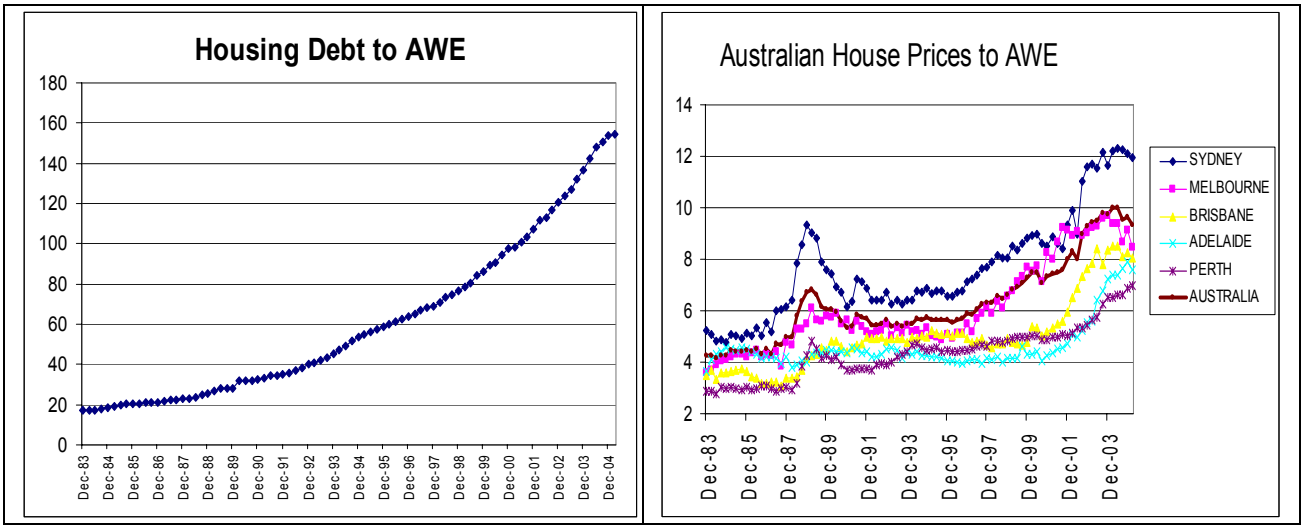
In the following I will attempt to:

- draw out some of the dangers of simplistic analysis of household balance sheets – especially those using debt to income ratios;
- explore what the data is really telling us re household balance sheets – including an alternative approach to the linkages between house prices and housing finance availability;
- present some empirical results on:
    - the drivers of Australian house prices, and
    - the linkages from house prices (and other variables) to consumer spending.

- and finally, I will attempt to draw all of the above together in a few conclusions about the operation of the economy and potential risks/challenges ahead.

**Be Careful in Interpreting Some Measures of Household Indebtedness/Gearing**

There is no doubt that increased gearing and significantly faster growth in Australian house prices relative to both broader measures of wage and price inflation, has seen fairly startling changes in some measures relating household debt to house prices and incomes. Two such commonly cited ratios are debt to income and house prices to income.




Source: ABS and RBA

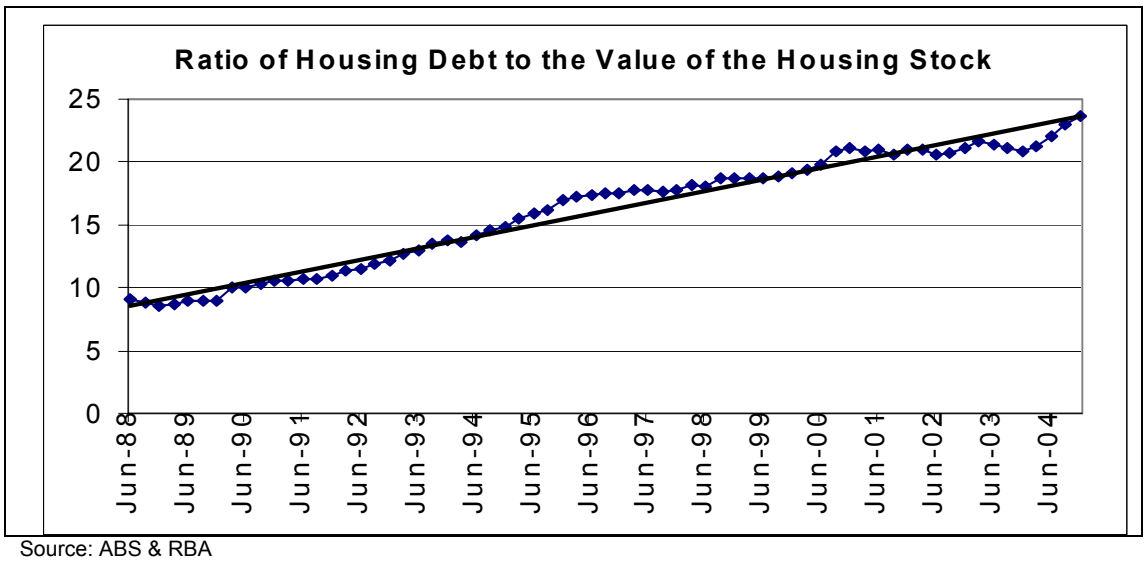
The above charts are clearly startling! Too often however analysts are inclined to say given these trends we have a "bubble" and it is, QED, only a matter of time before a large "correction" (read crunch) must follow.

Debt to income ratios, in particular, are misleading as the implicit assumption seems to be that, at current ratios, the whole process is unsustainable. My strong view is that all such ratios tell us is that there has been a fundamental change in the gearing ratios of households – but what ratio is unsustainable is uncertain. To put this in perspective, if ratios around 160 percent are unsustainable, how have countries like the Netherlands survived at ratios

approaching 300 percent. Further it should be noted that as only around one third of households have a mortgage the average debt to income ratio of those actually with a mortgage is also around 300 per cent. Even more important, as an economist, I have some difficulty in interpreting ratios comparing stocks of debt with income flows. House prices to income ratios clearly have implications for affordability (especially those new to the market) but do not necessarily give much useful knowledge about the sustainability of current ratios – provided the household has an on-going income flow. I intend to come back to this issue – which is critical – later in this paper.

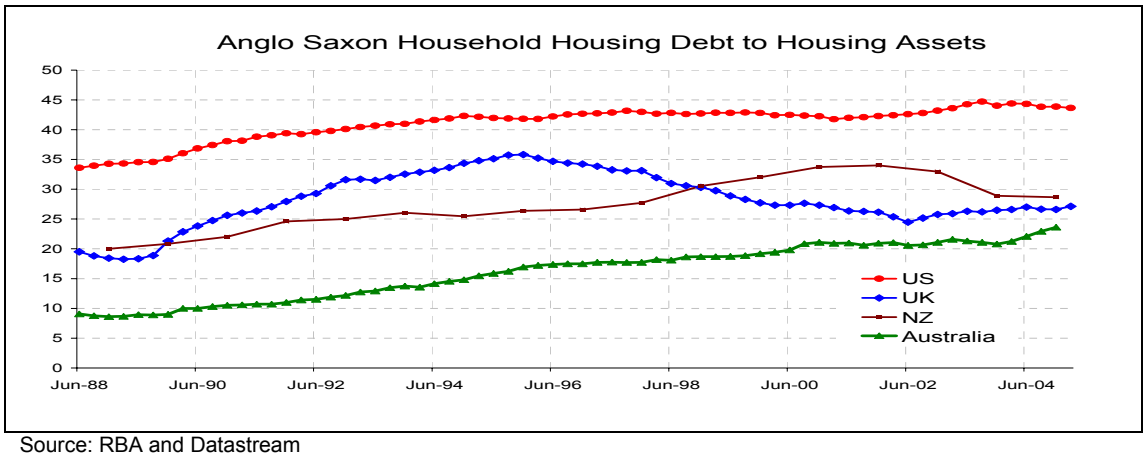
Rather than comparing stocks to flows, let us now look at stock to stock and flow to flow comparisons of movements in Australian household assets, debts and income levels.

While again it is difficult to know what is a sustainable level, the following chart shows Australian households' total housing debt to the value of the housing stock is much less alarmist. Indeed, it tends to point to a gradual trend acceleration in the debt to market value ratio since the late 1980's rather than the dramatic picture portrayed by the debt to income ratio.




Source: ABS & RBA

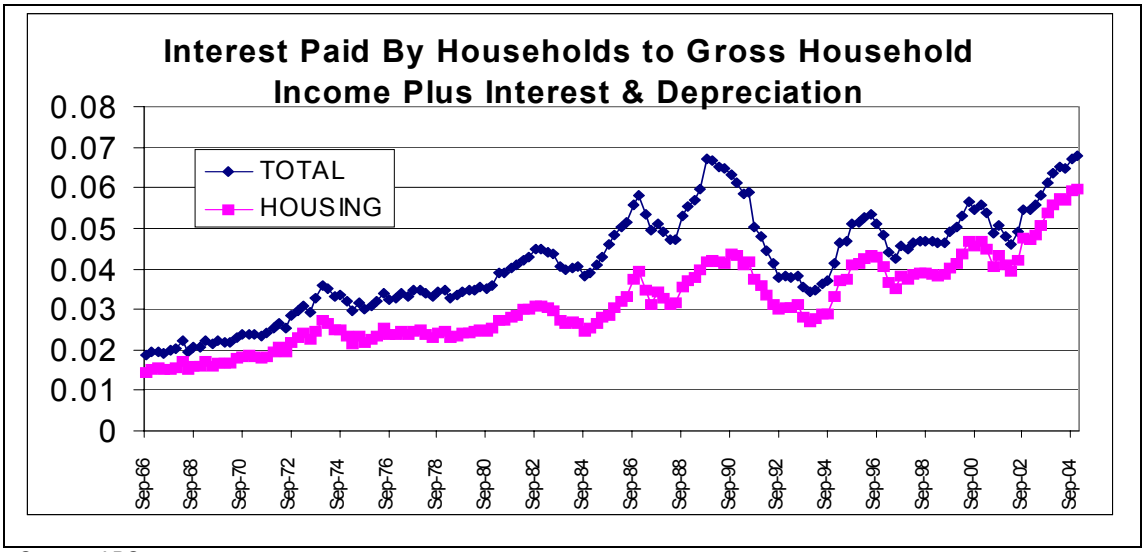
Equally an effective debt to equity ratio approaching 25 percent seems more reassuring – especially when compared to some other Anglo Saxon economies as shown below. In part, the true story is that Australian households started gearing up later than most, and whilst they have moved into debt more aggressively recently, they still have a relatively larger level of "equity" in their housing than other Anglo Saxon economies.




Source: RBA and Datastream

Turning then to flow comparisons, the following chart shows total interest paid by Australian households as a proportion to gross household income plus interest and depreciation. In

addition, the chart also shows total interest paid on mortgages as a proportion of the same income term.



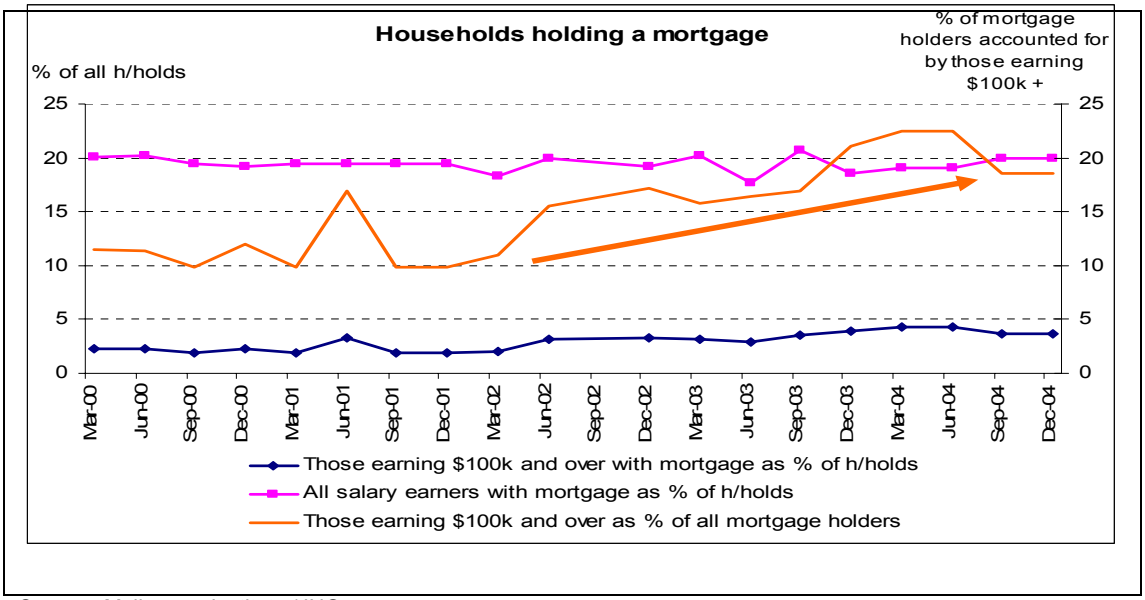

Source: ABS

There are a number of striking features of the above chart. First, and consistent with what has already been said, the chart clearly points to significant gearing up by households over the past 15 years. Second, there has been a considerable consolidation of total debts into the mortgage – ie the gap between total and housing interest paid has significantly narrowed. That in large part reflects the improved ability of households to access equity in their homes through financial product innovation and, one could argue, the increased ability of households to consolidate their debt (into typically lower interest rate home loan rates).

The third point that comes strongly out of the chart is the actual level of interest paid – either in total or on housing – has risen too, as a proportion of disposable income. That is, both measures are above the peak of the ratio reached in late 1980's/early 1990's when official cash rates reached 18 percent. In brief, if those levels of debt repayments crashed the Australian economy in the late 1980's, why not now?

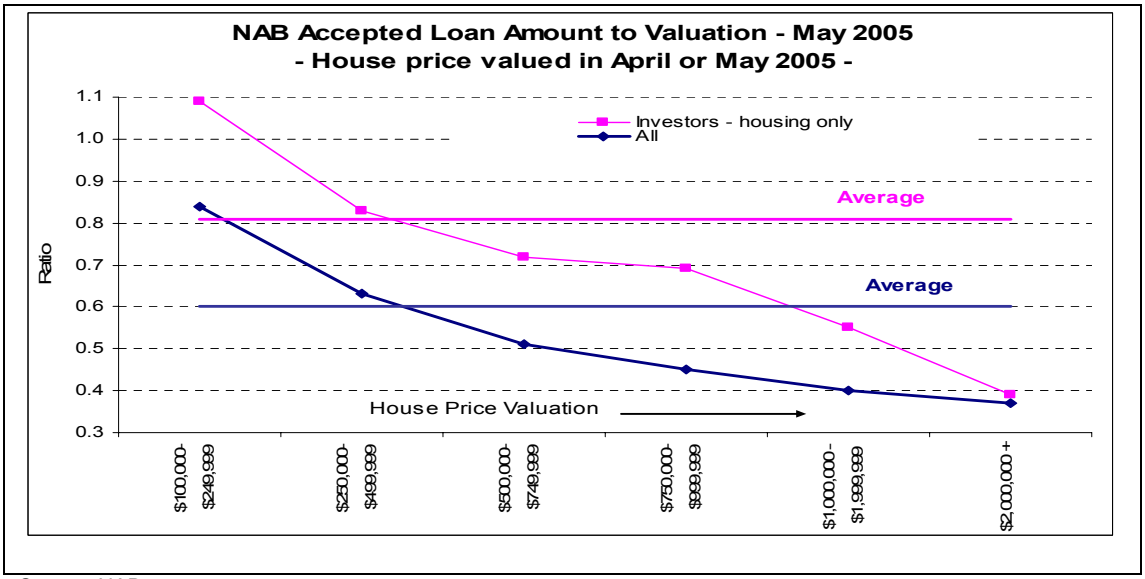
A significant part of the answer to that question relates to a change in the proportion of higher income earners going into housing assets from around 2000 – which, in turn, contributes to the sharp increase in the ratio from that time. In brief, the top income decile moved out of shares and voluntary superannuation and into housing. No doubt, the driver of that asset allocation shift was associated with falling global equity markets at that time and may have also reflected changes in capital gain tax rate – and especially, the gap between the latter and the top marginal tax rate.

While evident in the internal National Australia Bank Ltd data, there is also some evidence of that shift in asset allocation in publicly available data. Thus, for example, the recently released ABS Household Expenditure Survey suggests that between 1998/99 and 2003/04 owners with a mortgage in the top income quintile, increased by 9 percentage points vis-à-vis an increase of 5.4 percentage points for the entire household population.[4] Evidence of a move into housing by higher income earners in the early 2000's is also evident in the Melbourne Institute/ING Household Savings report. Thus, as shown in the chart below, data from this report, suggests that households with incomes above $100k and a mortgage, increased from around 2½ percent of all households to around 5 percent.




Source: Melbourne Institute / ING

What is important about this switch is that typically higher income earners with higher valued properties also have more assets for collateral against the loan. While there is little/no public data of this type available, the following chart underlines this relationship. The chart shows the loan to valuation ratio of NAB approved loans in April/May 2005 (using valuations made in April/May) against the value of the underlying property. The data is drawn from a population of 10,750 approvals with total value of just under $2.4 billion.




Source: NAB

All of the above does not detract from the fact that households are more geared and are more sensitive to either interest rate increases and/or loss of income flows (which are necessary to service that debt). But increased interest payments as a percentage of income and higher debt to income ratios are ***not*** necessarily indicators of current or future economic and financial stress. They undoubtedly reflect the combination of better economic conditions and low interest rates improving serviceability, together with a change in preferences of those at the top end of the income distribution to take on more housing debt. These households, however, also have significantly higher asset holdings and hence "average" ratios are not a good indication of imminent financial stress.[5]

**An Alternative Perspective on Housing Debt and House Prices**

One of the implications of the previous discussion is the increased willingness of households (especially at the top end) to gear up, and the effects of financial innovation that have increased households ability to tap into previously locked up equity in their property holdings.

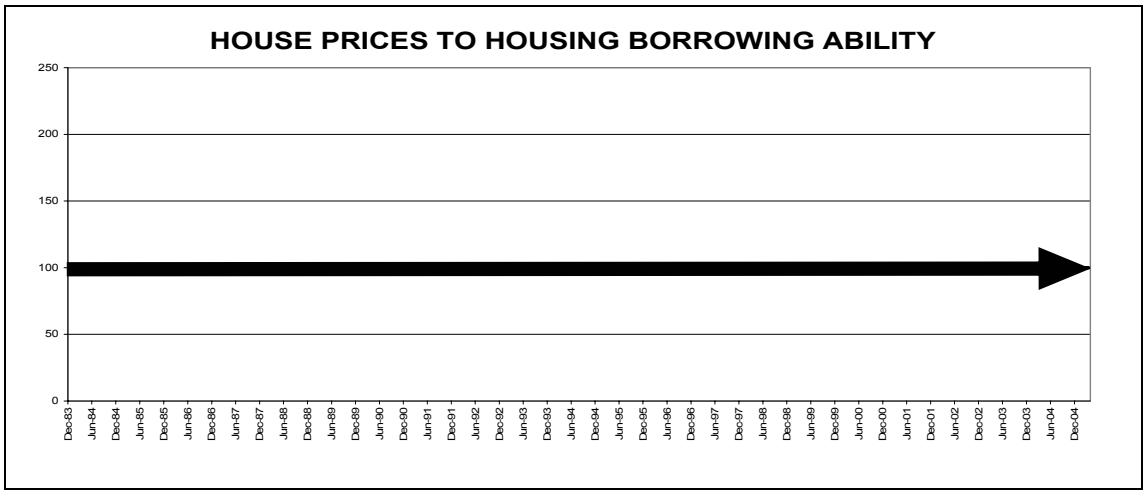
From that perspective we have attempted to generate a quarterly series which approximates a standard household's average ability to borrow against their property holding. That hypothetical borrowing ability (HBA) is given by the following formula.

HBA = Average Weekly Earnings x 52 x Bank Income Test x (1/Standard Home Loan Interest Rate) x Loan to Valuation Ratio

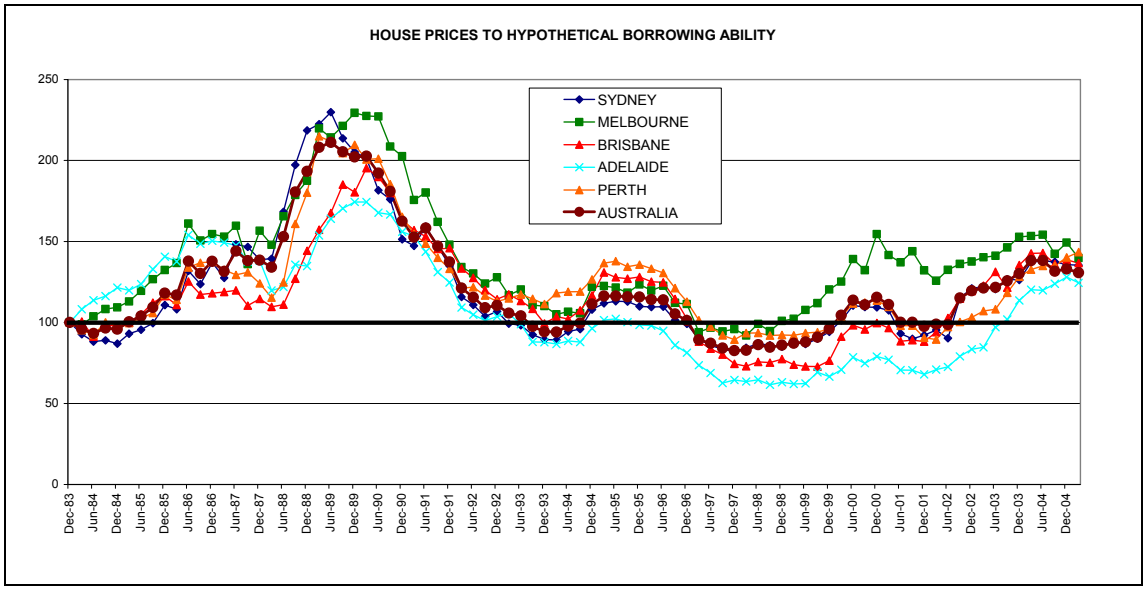
In the above formulae, regrettably, there is no publicly available time series data for either the bank income test or the loan to valuation ratios. Accordingly, as our start point, the HBA calculations are initially set with a bank income test (BIT) and loan to valuation ratios (LVR) of 0.25 of average weekly earnings (AWE) and 0.8 of property values respectively. The former reflects what might be considered a typical base level entry point for bank approved loans, while the latter is the maximum loan to valuation ratio that banks are prepared to accept without insurance and/or the level where different capital treatment for the loans are required. Later these ratios can be changed to test the sensitivity of the HBA. Use of state based AWE series allows the series to be calculated on a state by state basis. As a cross check, the HBA, using today's AWE estimates, was found to very closely replicate maximum bank lending calculations available on bank websites for a standard principle and interest on a 20 year home loan.

The state based HBAs, so calculated, were then compared to state based series of house prices using the REIA series. This series was used in preference to the ABS series - which in our view is more methodologically sound - for two main reasons. Firstly, it provides state based "level" estimates of house prices and, secondly, it allows for a longer run of time series (back to the December quarter 1983). Also it should be noted that there are few substantial differences in the long run rate of growth of the REIA and ABS house price series. To derive an Australian REIA series, the state based estimates were weighted by national account estimates for constant price real estate transfer expenses by state (i.e. the weights change quarterly) [6].

By setting the HBA against house prices (both state and nationally) we get some indication of how much increased house prices have been driven by increased borrowing ability. If, for example, households had just taken this ability to borrow (reflecting changed interest rates and earnings), and then fully used that ability to drive up house prices one would expect to see the following relationships (setting the HP/HBA index at 100 in December 1983).

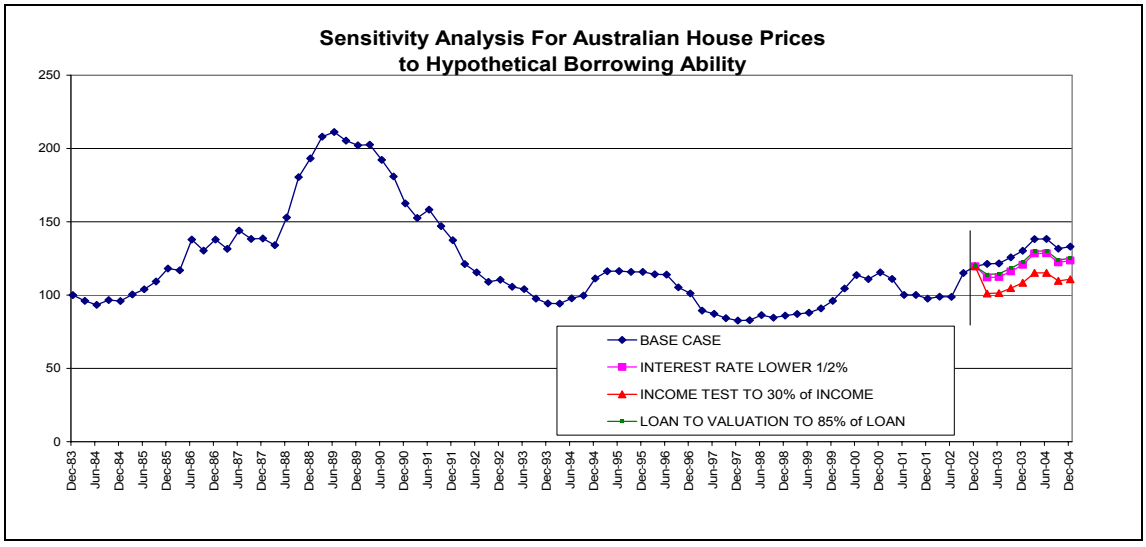


Equally it follows that a reading significantly above 100 could be interpreted as implying house prices being driven up significantly above any fundamental servicing ability and hence potentially pointing to a problem unless something else has fundamentally changed (eg a change in bank lending standards and/or a change in population growth). The following chart shows what the actual calculation shows (quarterly from 1983).



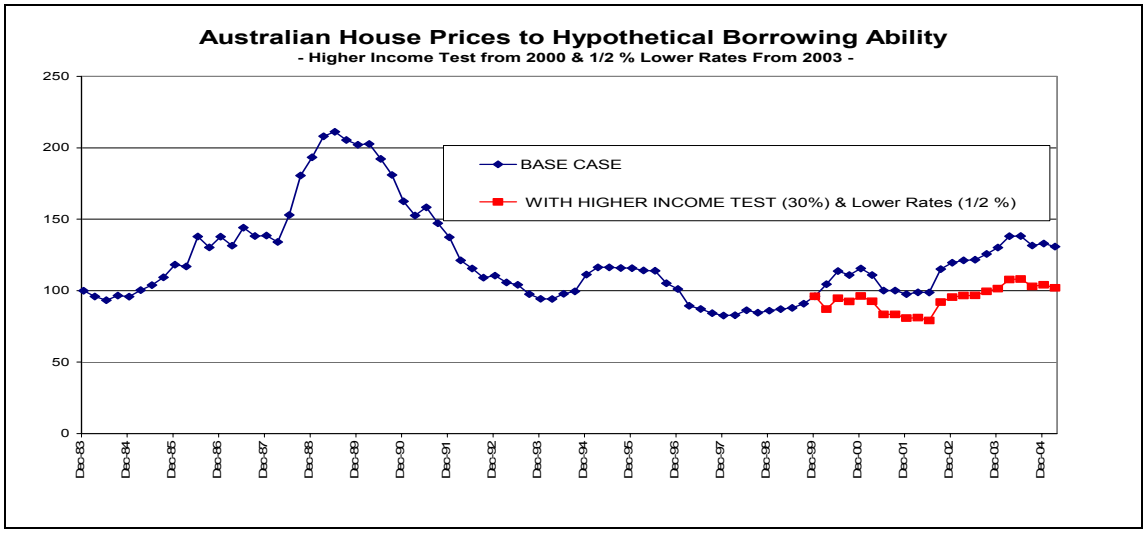

The first thing that is apparent from the above chart is that, while somewhat above 100, the HP/HBA current readings are no where near as extreme as the levels reached in the late 1990's. Again this underlines why, given current economic and financial conditions you should not be expecting to see signs of stress in household balance sheets, notwithstanding high debt to income ratios. It is also interesting to note that while measures such as house prices to AWE point to concerns about overpriced Sydney markets, that result does not come through in this analysis. Basically, the house price/income ratios tend to underplay the gearing ability that higher income levels in Sydney have when compared to the level of Sydney house prices.

The analysis using HBA is also helpful for examining the significance of the variables underpinning the calculations – ie sensitivity analysis. Thus, in the following chart the individual impact of: moving interest rates 50 points lower; or increasing the asset test to 30 percent of AWE; or increasing the LVR ratio to 85 percent. In each case the change is introduced at end 2002 and then maintained until the present.



This sensitivity analysis suggests that the largest impact on the HP/HBA ratio is derived from changing the bank asset test – with roughly equal, but more moderate effects from changing the LVR ratio and interest rates. A combination of moving all these levers a touch would clearly, given current readings, have the ability to return the HP/HBA index back to or even below 100.

While there is no official data on any of these variables, I suspect that some combination of all these factors has been in play. Certainly, the standard home loans rate is higher than what households on average pay (reflecting both discounting in the face of strong competition and gearing up at the top end of the income distribution where discounting for larger loans is more common). There is also much anecdotal evidence of some moderate easing in asset tests since early 2000. Thus, if we were to replace the standard home loans rate with NAB housing spread plus the cash rate (implying a gradual lowering of the effective standard home loan rate from early 2003 until today when the rate implied is around 50 basis points lower) and a generalised easing in the asset test to 30 percent of AWE from 2000, the path of the HP/HBA ratio would be as follows. Put another way, prices and borrowing ability have largely been aligned over the past couple of years.




Another way of using the HBA approach would be to note that even without changing the criteria used by banks/financial institutions, the combination of continued income growth at around 4 percent per annum, one rate cut of 25 points in early 2006 (our forecast) and no change in house prices would bring the HP/HBA ratio back to around 100 by early 2008.

The bottom line to all of the above is that broadly house prices do not look out of line with what might have been expected given households increased incomes, reduced interest rates and some marginal easing in bank lending criteria. But under no circumstances can it be argued that house prices are way out of kilter with what could be expected (á la the late 1980's).

That is not to say that household sensitivity to higher interest rates (or lower incomes) has not been fundamentally changed by increased gearing. The simplest way to show this is to note that by shocking interest rates by 2½ percentage points (lets assume less discounting and a 2 percentage point increase in the official cash rate) would, with no change in house prices or incomes, produce the same level of "disequilibrium" in the HP/HBA ratio as that experienced in the late 1980's. Clearly, in these circumstances, house prices and incomes would both fall with substantial real activity effects on the real economy.

**What Determines House Prices: What the Australian Data Tells Us**

In this section, we attempt to put a little more rigour into an explanation of what drives house prices – or at least what the Australian data points to. In terms of a longer run relationship clearly one would expect that the key drivers of HBA to be important – namely interest rates and household incomes. Beyond that, population growth, on the supply side, could also be expected to be important. Thus, we begin by estimating a long run (co-integrating) log linear equation of the type:

$$LnHP_t = \alpha_0 + \alpha_1 \text{ Ln } (Pop)_t + \alpha_2 \text{ Ln } (HDY)_t + \alpha_3 \text{ Ln } (^i/_p)_t$$

Where: $HP_t$ equals Australian house prices (as calculated in the previous section – i.e. using REIA state data, weighted by state real estate transfer expenses from the national accounts)[7]; $Pop_t$ is Australian population; $HDY_t$ is nominal household disposable income; and $^i/_{p\ t}$ is real interest rates using the 90 bill rate deflated by the previous twelve month rate of increase in the trimmed mean CPI. We would expect that $\alpha_1$ $\alpha_2>0$ and $\alpha_3<0$ – that is, house prices move up with further growth in population and income but down in the face of higher real interest rates. Estimating the equation from 1983(1) to 2005(1) produced the following:

$$LnHP_t = -38.69^{**} + 3.80 \text{ Ln}(Pop)_t^{**} + 0.489 \text{ Ln } (HDY)_t^{**} - .108 \text{ Ln}(^i/_p)_t^{**}$$

$R^{\wedge 2} = .982$ $\sigma = .02$ **is significant at the 5% level.

Thus all variables are significant at the 5 percent level and have economically meaningful signs. Indeed, the equation points to fairly large effects from population and income and interestingly real rates as well. Indeed, we will later see in the next section on consumption and house prices, it appears that the transmission mechanism of high real interest rates goes through this significant impact on house prices, rather than directly entering into the consumption function.

To complete this simple modelling of house prices, we employ the error correction methodology (ECM) of Engle & Granger (1987)[8] to estimate the short run dynamics of house price formation. Going from the general form to the specific short run equation we included changes in all the variables (except population) in the long run equation, with the addition of changes in unemployment (to proxy uncertainties or expectations about future income flows), share prices (an additional wealth term) and housing starts (to account for short run housing cycle dynamics). Population has been excluded from the short term dynamic equation because population changes tend to be more gradual. Because house prices are relatively sticky the specific short-run equation was estimated in the $DLn_{t-4}$ form, representing annual changes. Estimating from 1983(2) to 2005(1), with all variables tested with lags up to 8 quarters, yielded the following equation:

$$DLn(HP)_{t-4} = .086^{**} + .82 \text{ DLn } (HDY)_{t-4}^{**} + .036 \text{ DLn } (sp)_{t-4}^{**} + .09 \text{ DLn } (HS)_{t-4}^{**}$$

$$-0.10DLn\ (UN)_{t-4}^{**} - .037DLn\ (^i/_p)_{t-4}^{**} + .64\ (DLn\ ((HP)_{t-4})_{t-1}^{**} - 0.15\varepsilon_{t-4}^{**}$$

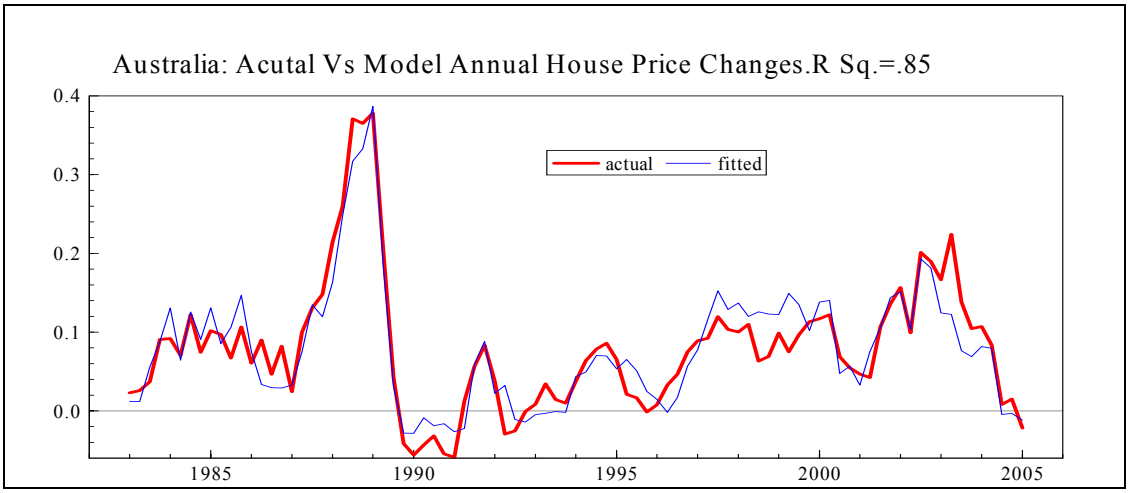
$R^{\wedge 2} = .875$ $\sigma = .029$ ( Excluding the autoregressive term $R^{\wedge 2} = .85$)

The equation passes normality and stability tests but the autoregressive term was included to correct for autocorrelation. The latter had the effect of increasing the elasticity on changes in income and making changes in short term interest rates significant (albeit with a small elasticity). Other elasticities were not much changed. There was also no evidence of ARCH effects in the residuals. The diagnostics for the house price change equation are presented in the table below.

**Table: Residual Diagnostics for the House Price Equation (Short Run Change)**

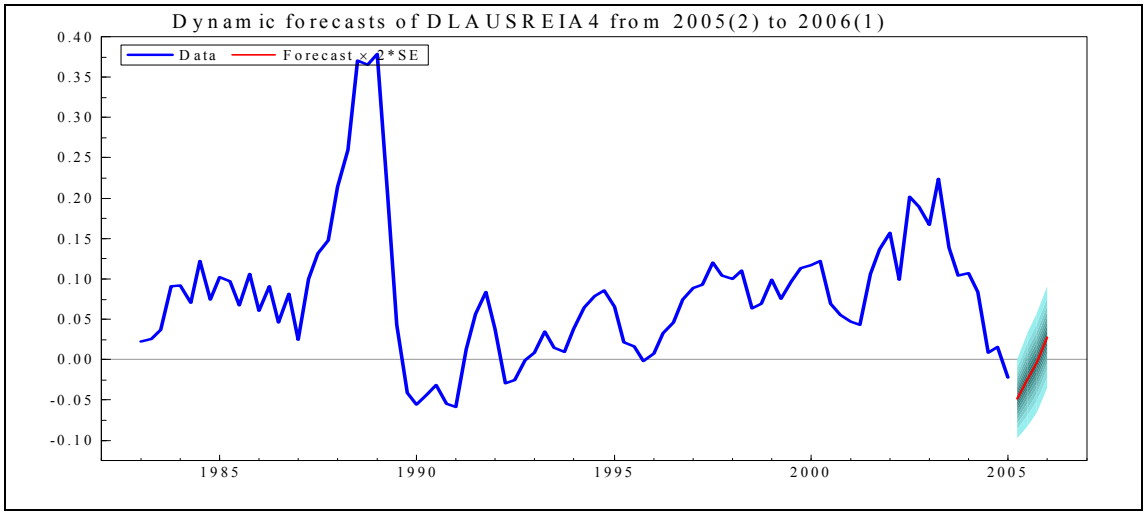
| | Statistic | P - Value |
|---|---|---|
| **Normality Test** | .0157 | 0.997 |
| **AR 1-4 Test** | 1.0446 | 0.3903 |
| **ARCH 1-4 Test** | 1.1432 | 0.3437 |

Basically, the short run equation suggests that population while important in the long run does not enter short-term dynamics. Rather the key determinants of short-run dynamics - in addition to the adjustment process from the longer run equation, which the short run equation implies takes around 1½ years – are: changes of income; changes in the share prices; changes in house starts; changes in real interest rates and unemployment. All estimated coefficients have the expected signs and appear economically meaningful. As shown below the equation (excluding the autoregressive term) has reasonably accurately captured the Australian house cycle dynamics since the early 1980's.




While the importance of terms such as income, population and interest rates could be expected, the importance of changes in unemployment is also worth noting. Previous work on great housing price "crashes" offshore has, in our view, always pointed to the need for the combination of sharp increases in house prices and gearing (such as would be expected by exceptionally high values for the HP/HBA ratio) together with the loss of an income stream to finance that level of borrowings (ie the combination of reduced household incomes and associated unemployment). While such "crashes" have not been evident in Australia over the past 50 years, the above equation suggests that such a mechanism would equally apply in Australia given the necessary triggers.

Turning then to forecasting house prices. To some extent our forecasts of house prices using the above framework will only be as good as our forecasts for the key variables. That said, adopting our current medium term expectations of slower domestic demand, a moderate (10 percent) further fall in construction activity, inflation rising to around 2¾ percent, a rate cut of 25 points early in 2006, and a gradual increase in unemployment to around 5¾ percent by mid 2006, these equations basically suggest some moderate further falls in Australian house prices in late 2005 with only modest increases in 2006. That is, given a broadly consensus (to a touch bearish) view of the economic outlook, these results essentially suggest a period of stagnant house prices over the next 12 months – but no crash.




Finally, on house price forecasting, it should also be noted that while the data does not exist to formally replicate these equations at the state level, it would suggest better outcomes for states where income growth is higher, the unemployment deteriorates less, and population growth is stronger. That clearly would seem to support better near term outcomes for house prices in Western Australia and to a lesser extent Queensland, than for New South Wales and Victoria.

**Australian Consumption: The Impact of House Prices and Wealth**

In this section, we turn to examining the linkages between house prices and aggregate consumer spending. To do this, we again use the ECM approach to estimate long run (co-integrating) and short run dynamic consumption equations.

There is a long tradition of estimating long run consumption equations with key variables being income, housing wealth, financial wealth and real interest rates. Rather than starting out with housing and financial wealth, however, we replaced these variables by their key drivers, house prices and equity prices. The house price term is the same one used earlier and the equity term is the ASX200. To some extent the use of the equity term also could be justified via the literature which suggests that superannuation is very much viewed as a veil. The income term used is real household disposable income. The estimated long run co-integrating equation (estimated from 1982(1) to 2005(1) is as follows:

$$\text{Ln } C_t = .826^{**} + .877 \text{ Ln}(Y)_t^{**} + .109 \text{ Ln } (HP)_t^{**} + .002 \text{ Ln } (SP)_t^{**}$$

$R^{\wedge 2} = .997 \quad \sigma = .011 \quad$ ** signifies significance at the 5% level.

As expected $\alpha_1\ \alpha_2\ \alpha_3 > 0$ and are all significant. In the long run, the equation is suggesting a propensity to consume out of real disposable income of around 87 percent. What is particularly striking, however, is the very large elasticity on house prices – implying that a 10% change in house prices leads to a 1% change in real consumption. As implied in the previous section, there is a very high degree of correlation between interest rates and house prices. And, as a result, when the real interest rate term is included in the above equation it is either insignificant or enters with a minimal elasticity. Accordingly, real interest rates are dropped in our preferred long run equation – which as noted earlier implies that in a long run sense interest rates enter the consumption equation mainly via their impact on house prices.

The other result in the equation that bears commenting on is the relatively small elasticity on the share market term. Quite often elasticities associated with share market terms are estimated at between .01 and .05 (vis-à-vis .002 in our preferred equation). What appears to be happening is that the strength of recent share market does not sit well against the recent pattern of slower growth in consumption. In addition, it appears that, in the past, changes in Australian petrol prices (as reflected in the CPI) have typically had adverse impacts on share

market performance (which has certainly not been the case over the past year or so). This can be shown by including petrol prices (CPI based measure) into the longer run equation. The implied long run elasticities that result are more like those traditionally estimated for the share market (or financial wealth) and imply elasticities of around -0.06 for petrol (that is 10¢ a litre reduces consumption by around 0.6). The impact on the coefficients in the long run equation, with and without petrol, is shown in the following table. For completeness, we have also included coefficients derived from IMF estimates of a long run equation based on housing wealth and financial wealth (rather than house prices and share markets). The IMF equation also finds a very small but positive real interest rate effect.

| | Our Preferred LR Equation | Preferred Equation with Petrol Prices included | IMF |
|---|---|---|---|
| **Constant** | .826** | 1.025** | .87** |
| **Real Household Disposable Income** | .877** | .871** | .81** |
| **House Prices** | .109** | .134** | |
| **House Price Wealth** | | | .15** |
| **ASX 200** | .0017** | .013** | |
| **Financial Wealth** | | | .009 (not significant) |
| **Petrol Prices** | | -.066** | |
| **Real Interest Rate** | | | -.006** |
| **Estimation Period** | 1982(2)-2005(1) | 1982(2)-2005(1) | 1988(1)-2004(4) |
| **$R^{\wedge 2}$** | .997 | .998 | .996 |
| **σ** | .011 | .010 | |

Clearly there is little to choose between our preferred equation and the equation including fuel. To some extent, the choice between the two comes down to whether you prefer to think of petrol prices as having a long run or short-run impact. As we will soon see when imposing a short run dynamic equation on top of these equations, the data tends to prefer petrol as a short term impact (i.e. like a tax). Both of these equations, while similar to the IMF's wealth based equations, perform better. But from a house price perspective, what is both interesting and compelling is the very high (and similar) estimated impact of house prices (or housing wealth) on consumption patterns.

Turning to the short-run dynamic equation, the changes to the variables in the long run equation were included together with the change in petrol prices. The resultant equation, estimated from 1982(2) to 2005(1), with all variables tested with lags up to 8 quarters, is:

$$D\ Ln\ (C)_t = .005^{**} + .061\ D\ Ln\ (Y)_t^{**} + .078\ D\ Ln\ (HP)_t^{**} + .009\ D\ Ln\ (SP)_t^{**} - 0.022\ D\ Ln\ (PP)_t^{**} - 0.09^4\varepsilon_t - 1^{**}$$

$R^{\wedge 2} = .459 \quad \sigma = .0045 \quad$ ** Significant at 5% level

The equation passes normality and stability tests. It also passes tests for auto correlated residuals at the 5 percent level of significance (but not at 10 percent level – which is confirmed by an ACF suggesting marginal problems at the 3rd order). There was also no evidence of ARCH effects in the residuals. The diagnostics for the consumption equation are presented in the table below.

**Table: Residual Diagnostics for the Consumption Equation (Short Run Change)**

| | Statistic | P - Value |
|---|---|---|
| **Normality Test** | 3.4902 | 0.1746 |
| **AR 1-4 Test** | 2.0501 | 0.0955 |
| **ARCH 1-4 Test** | 0.7967 | 0.5311 |
| **Heteroscedasticity Test** | 13.0182 | 0.7905 |

Basically the equation is again highlighting a strong short term input from changes in income, house prices and petrol prices. With the elasticity on petrol suggesting a 10¢ per litre increase reduces consumption growth by around 0.2 percent in the short run. Share prices also play a very small role. The equation also suggests an adjustment speed back to equilibrium of around 2 1/2 years.

For completeness the following shows the results of the same short term equation specification put on top of the long run equation including petrol prices:

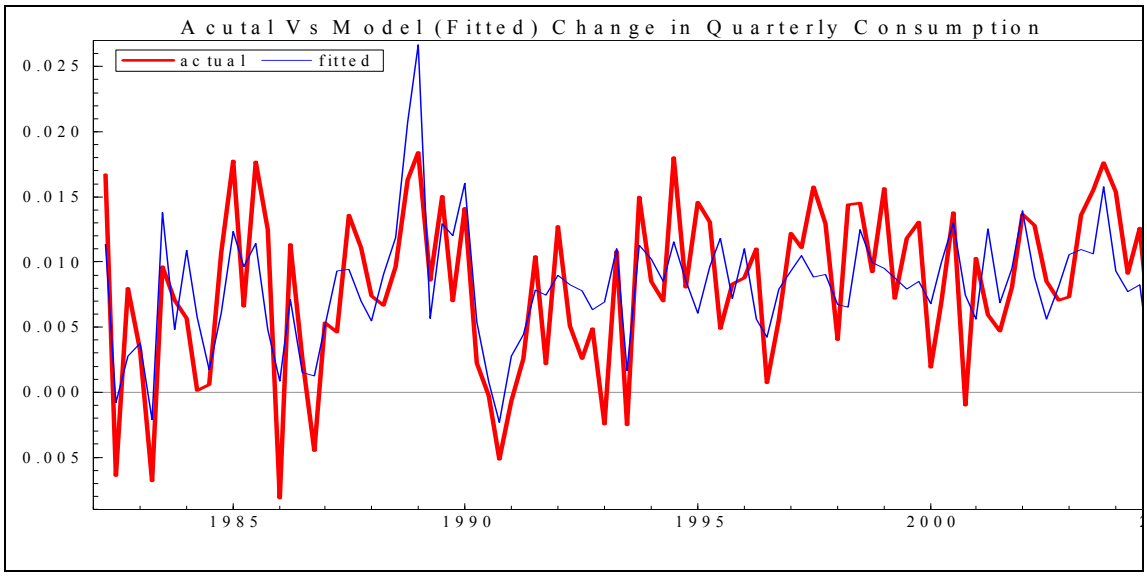
$$D\ Ln\ (C)_t = .005^{**} + .055\ D\ Ln\ (Y)_t^{**} + .034\ D\ Ln\ (HP)_t^{**} - .0004\ D\ Ln\ (SP)_t^{**} - 0.11\varepsilon_{t-1}$$

$R^{\wedge 2}$ = .40  σ = .0048  **Significant at 5% level

Relative to the previous short run equation, the elasticities on income are a touch lower, the elasticity on the share market is reduced to very small amounts and is incorrectly signed, and the equation did not find any significant additional link to changes in petrol prices. To the extent that we tend to think of petrol price changes as a tax, this suggests that our preferred equation is, from an economic viewpoint, superior. Also the above equation has marginally less explanatory power and while it passes normality and stability tests, it fails tests for auto correlated residuals.

As shown in the following chart, as well as having both economically meaningful and significant elasticities, our preferred consumption equations - with petrol in the short run but not in the longer run – have also tracked the actual quarterly changes in consumption reasonably well over the past 20 odd years. Interestingly the equation also has little problem with explaining the marked slowing in consumption growth in 2004, which many commentators at the time, including the Reserve Bank, cast doubt on. Also given differences in the house price cycle across states it would follow that a good part of the stronger consumer spending observed in Western Australia in particular but also Queensland relate to this factor.

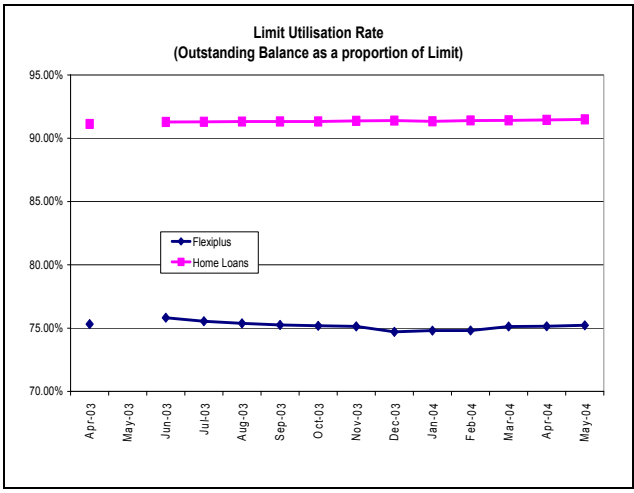
**Model v Actuals using Our Preferred Consumption Model – ie Fuel in the Short Run but Not in Long Run Equations:**

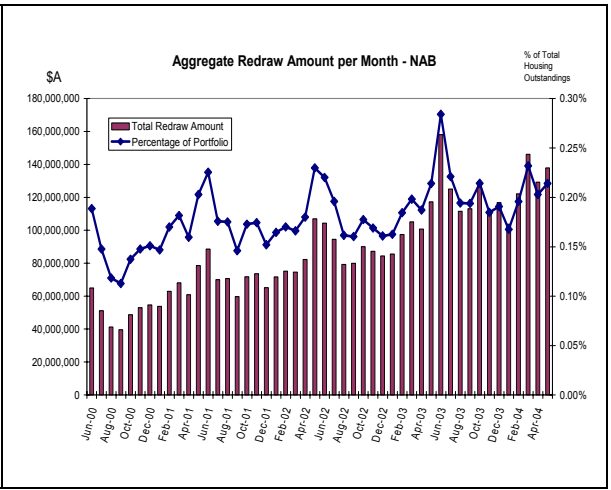



Given the relatively high level of explanatory power provided by our preferred set of equations, a question arises about the impact of housing equity withdrawal on consumer spending. This concept has received much popular attention (and was originally injected into the debate by the RBA using Bank of England definitions). Basically, housing equity withdrawal /addition is defined by the RBA/Bank of England as the difference between the change in housing credit and the sum of new housing investment, alterations & additions and government transfer expense (eg stamp duty). In the public arena, the concept has generally been simplified to the view that households have been withdrawing the extra equity built up in their housing by house price increases to maintain high levels of consumption spending in the face of lower growth rates in household incomes. The implication being that once house price appreciation stops consumption must fall significantly.

Looking back at our preferred equation it is clear that changes in house prices have a very important impact; both in the short and long run. However, it would appear that the mechanism captured by the equation is one whereby households run-up or run-down their propensity to consume out of income in the face of housing price changes. If you like, in a time of rapid increases in house prices consumers are more inclined to run down saving balances and to some extent become "more asset rich and cash poor" – with the reverse occurring in times of slowing house price growth.

On the question of households actually using their "redraw" ability, there is no economy wide data available – albeit the RBA is currently conducting a survey to better capture information on what is happening here. That said, data from NAB covering actual redraws over the past few years suggests that there is a strong presumption that the physical use of "redraw" has not been a significant factor in explaining consumer growth. Thus, the left hand panel of the following chart shows the behaviour of limit utilisation in the period from early 2003 to mid 2004 (i.e. the peak period of negative housing equity withdrawal according to RBA data). If households had really withdrawn around $50b in this period (as implied by the RBA estimates) one would have expected to see a significant increase in households' utilisation of their drawing ability – clearly the chart shows that didn't happen (at least at NAB). Secondly, the right hand panel of the chart shows a relatively steady proportion of NAB's housing book being used for redraw in the period from 2000 to mid 2004. That proportion however is very small – at around 0.20 percent of the total book or a level of between $60m in 2000 to around $160m in mid 2004 (vis a vis a total book of NAB home loans of around $100bn). The implication of these charts is that whatever role so called "housing equity redraw" (HEW) has played in changes in consumption (as against changing savings) behaviour, the actual equity withdrawal process is a very minor part of the story.




To further test this hypothesis, the Reserve Bank estimates for housing equity withdrawal (HEW) were entered into both our preferred consumption equities. The results are shown in the following table (all reported coefficients are significant at the 5% level):

| | Long Run Equation | | Short Run Equation | |
|---|---|---|---|---|
| **Elasticities** | **Preferred Equation without HEW** | **Preferred Equation with HEW** | **Preferred Equation without HEW** | **Preferred Equation with HEW** |
| **Real Household Disposable Income** | .877 | .863 | | |
| **House Prices** | .1087 | .093 | | |
| **ASX 200** | .0017 | .018 | | |
| **HEW** | – | .036 | | |
| **Constant** | .8259 | .992 | | |
| **Δ Real Household Disposable Income** | | | .061 | .1067 |
| **Δ House Prices** | | | .078 | .094 |
| **Δ ASX 200** | | | .009 | Not significant |
| **Δ Petrol** | | | -.022 | -.047 |
| **Δ HEW** | | | – | Not significant |
| **$\varepsilon_{t-1}$** | | | -.094 | -.184 |

| | | | | |
|---|---|---|---|---|
| $R^{\wedge 2}$ | .9975 | .9986 | .459 | .442 |
| σ | .0108 | .0087 | .0046 | .0046 |

These results suggest that, in the longer run, the housing equity withdrawal term as calculated by the RBA does add, at the margin, to our preferred long run equation – albeit the implied elasticities on HEW is small. The elasticities on our other key variables are broadly unchanged (albeit the constant term is reduced somewhat and the ASX term is increased). There was however no significant effect found for HEW term in the short run equation. That said, relative to the long run relationship including HEW, the elasticities on short run income, house prices and petrol prices increased somewhat, the ASX term dropped out, and the adjustment speed back to the longer run equilibrium was marginally faster. Overall the new short run equation, based on the long run relationship including HEW, performed marginally worse than our preferred short run equation. Finally, either including or excluding the HEW term made little difference to stability, normality or autocorrelation test results.

The bottom line, for the above results, is very much, that while including the HEW term improves the long run consumption relationship its impact is marginal in understanding the dynamics of consumer spending decisions – and is certainly not the main (or even a very important) mechanism of translating housing price changes (and or wealth) to consumer activity. Put slightly differently, if house prices, for whatever reason, were to fall significantly it would matter little as to whether housing equity withdrawal had stopped or not.

**Concluding Observations and Summary**

I turn now to summarise some of the main themes picked up in the paper. Clearly house prices and questions about "bubbles" and their implications for future economic growth are very topical. Unfortunately too much of the popular debate has, at the very least, been simplistic in nature and, more often than not, highly misleading.

High debt to income ratios, do not mean, given current policy settings, that current gearing ratios are either unsustainable or that a crash is inevitable. Also from a balance sheet perspective the total level of debt relative to their assets are relatively low relative to other Anglo Saxon economies. What higher debt to income, or more importantly, higher interest paid to disposable income ratios point to, is a much higher level of gearing in Australian household balance sheets. This means that Australian consumers will be more sensitive to both actual movements in, and expectations about, interest rates and house prices. Jawboning on the latter aspect has, in my opinion, been very effectively used by the Reserve Bank to effectively talk down the so called housing "bubble". The effectiveness of that process avoided the need to do much in the way of monetary policy tightening, which, if it had been used, would have carried a much higher risk of a hard landing.

It is important to also realise that there have, in recent years been some important changes, by income decile, in the holding of housing debt. Thus part of the reason why there was a sharp increase in the "average" level of interest paid to disposable income, in the period around the early 2000s, relates to a shift by the top income decile out of equities and superannuation and into housing (especially investment housing). That, in part, reflected relative returns in those markets, but probably also reflected tax wedges opened up between the top marginal tax rate and capital gains tax rate. What is important to note is that the top income decile while carrying more debt also typically has more assets (i.e. lower loan to valuation ratios). Once again, the main message relates to interest rate sensitivities rather than issues of sustainability (given current policy settings).

In the paper we have also introduced the concept of a hypothetical borrowing ability, which when compared to actual movements in house prices, suggests that over the past 20 years households have effectively used their increased borrowing ability, associated with rising incomes and falling interest rates to bid up house prices. Further this analysis suggests that current house price levels (unlike the late 1980's early 1990's) are not that far out of line with households financing ability – particularly when some allowance is made for moderate price discounting of standard home loan rates and some easing in asset test standards by financial institutions. The analysis also highlights the now much heightened sensitivity to interest rate

movements – with a 2½ percent increase in rates being sufficient to create the same disequilibrium between the HBA and house prices as was apparent in the late 1980's/early 1990's.

Not surprisingly the key drivers of HBA – income and interest rates – together with population growth – were found, econometrically, to have played a major role in explaining long run movements in Australian house prices since the early 1980's. Beyond that, the construction cycle and the level of unemployment were also found to be important in explaining the shorter run dynamics of the house price cycle in Australia. Further, when broadly "consensus" type forecasts of key variables in these equations are adopted, the outlook for house prices, over the next 12-18 months, appears to be one of stagnation– but not a crash. That said, the equations underline the point that the house price outlook is extremely dependent on movements in interest rates and unemployment.

Finally, by way of estimating a series of short and long run consumption functions, a key message that emerged was the very large elasticities that now run from changes in the rate of growth of house prices to consumption. Interestingly, they also imply that the main impact of interest rates on consumer spending decisions comes via their impact on house prices. Broadly the results suggest a 10 percent change in the rate of growth of house prices is associated with around a 1 percent slowing in consumption expenditure. These elasticities are considerably larger than those associated with petrol prices and equity markets, and in our view are very important in explaining the recent slowing in Australian households spending patterns.

The dynamic, in our preferred equations, was very much one whereby households run-up or run-down their long run propensity to consume out of real disposable income (estimated at around 87 percent) in the face of changes in the rate of growth of house prices. That is, in a time of rapid increases in house prices, consumers are inclined to run down their implied long run savings behaviour and become "more asset rich and cash poor" – with the reverse occurring in times of slowing house price growth.

Running on from that dynamic, there is a good deal of doubt as to whether housing equity withdrawal, as popularly understood, is actually occurring. Information from the National's experience with redraw and loan utilisation limits do not support the hypothesis that redrawing equity from increased house prices was significant in recent years. Including RBA estimates for housing equity redraw, in our preferred longer run equations did add some added power, but its impact on the dynamics of consumer spending decisions was found to be relatively marginal. Rather, the main mechanism, as noted above, appears to be very much via changed "savings" behaviour.

In conclusion let me go back to the title of the paper – and, in particular, the reference to irrational or rational exuberance. It strikes me that the tag "irrational exuberance" can perhaps be better placed with the vigour to which some analysts use added debt levels in Australia to forecast "gloom and doom" - rather than the actual behaviour of Australian households over the past few years. Given current policy settings and house price levels household behaviour indeed looks reasonably rational. That, however, is not to say that there hasn't been a fundamental change in Australia household balance sheets – with profound implications for their sensitivity to actual, or threatened, swings in interest rates and house prices. Clearly households are now, because of their increased gearing, much more sensitive to interest rates. Also the impact of house price movements to real activity is much higher than is often understood – and what matters is the change in the relative growth rate of house prices and not whether levels are going up or down.

Perhaps consumers are more aware of these dynamics than we give them credit and hence their apparent continual focus on "what will happen to my house price". From a policy viewpoint, the strength of the linkage from interest rates to house prices and then to consumer spending reinforces the view that, to avoid mistakes, the RBA will need to continue to be very measured in any change in policy settings. Perhaps for commentators and the public, it also means that we should all expect to see "Maradona" monetary policy alive and well for many years to come.

Footnotes:

1) The Economist, 8 March 2003 “The Lucky Country”;

The Economist, 5 June 2004 “Homing in on the Risks – House Price and the World Economy”;

The Economist, 18 June 2005 “In Come the Waves – The Global Housing Boom”

2) Mervyn King, the Bank of England Governor, in the May 2005 Mais Lecture, likened the UK’s central bank’s approach to rate policy to the Argentine striker, who was able to run straight at England’s goal in the 1986 World Cup because the defenders were expecting him to move to the left or right. Governor King then suggested monetary policy could act in a similar way, because movements in market expectations of interest rates might be enough to stabilise the economy without a need for changes to rates.

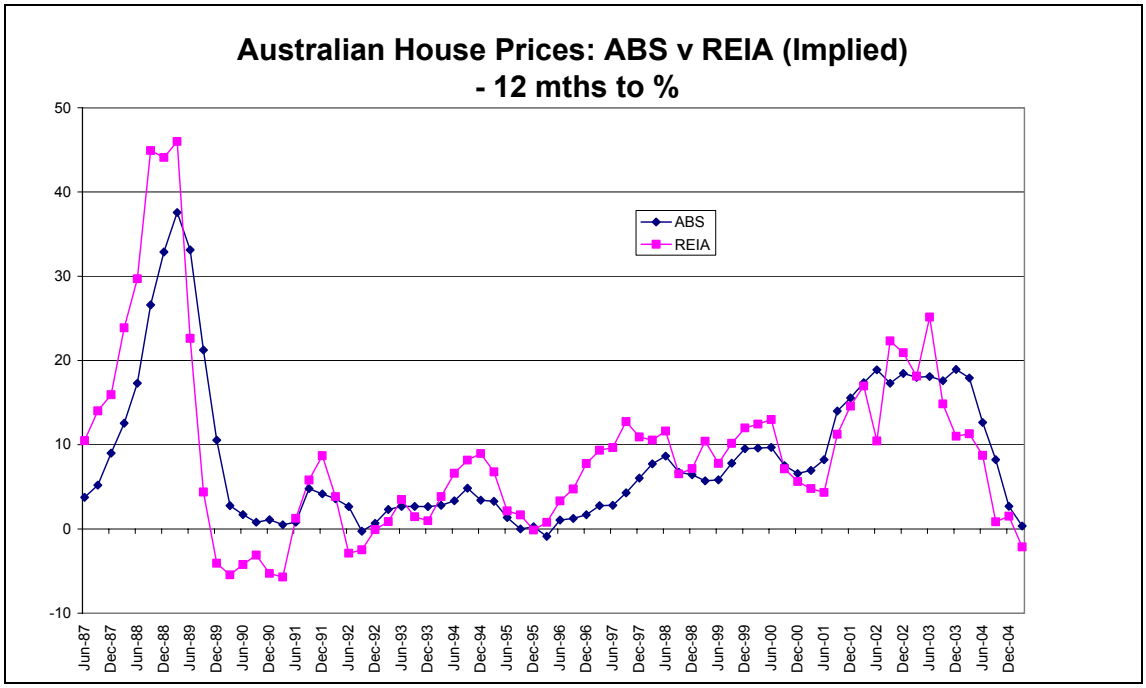
3) See: “Opening Statement to House of Representatives Standing Committee on Economics, Finance and Public Administration”, Melbourne – 12 August 2005

4) The following table shows ABS Household Expenditure Survey Estimates for the proportion of households owning a property by income quintile, either with or without a mortgage.

| ABS Household Expenditure Survey (6535.0) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tenure and landlord type by income quintile group | | | | | | | | | |
| | | Lowest | Second | Third | Fourth | Highest | Change in Highest | Total | Change in |
| Owner without a mortgage (%) | 1998/9 | 53.7 | 50.8 | 31.6 | 29.7 | 32.5 | Quintile | 39.7 | Total Population |
| | 2003/4 | 53.2 | 46.4 | 27.3 | 22 | 25.8 | -6.7 | 34.9 | -4.8 |
| | | | | | | | | | |
| Owner with a mortgage (%) | 1998/9 | 8.6 | 14.3 | 33.7 | 44.6 | 47.4 | | 29.7 | |
| | 2003/4 | 8.4 | 19.5 | 38.4 | 52.7 | 56.4 | 9 | 35.1 | 5.4 |
| | | | | | | | | | |
| | | | | | | | | | |

5) Broadly similar conclusions about the absence of financial stress in Australian households, despite higher income and debt ratios, was also found by Gianni La Cave and John Simon in RBA Research Discussion Paper 2003-08. That paper “A Tale of Two Surveys: Household Debt and Financial Constraint in Australia”, used Hilda and HES data and after separating households into “constrained” and “unconstrained” categories, found that much of the increased debt related to unconstrained households taking on more debt.

6) The following chart shows the differences in Australian house prices growth as calculated using REIA data and that using the ABS series. While there are differences in growth rates they are not substantial. Also it should be noted that much of the recent debate about what is the best or most useful measure of house prices really relates to the timeliness of the ABS data – not whether it is applying the best methodology and is the most accurate.




7) Use of the ABS house price series was also tested but the results did not vary significantly. In essence, we have opted for a slightly inferior methodological series which does not provide fundamentally different growth rates to those generated by the ABS series, but has the advantage of providing a longer run of time series data (i.e. back to the early 1980s).

8) Engle, R.F. and Granger, C.W.J. (1987), "Cointegration and error correction representation, estimation and testing", *Econometrica*, Vol. 55No.2, pp .251-76.

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