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Working Party on National Accounts

**NON-FINANCIAL ASSETS: RECENT DEVELOPMENTS IN THE HOUSEHOLD BALANCE SHEET
IN AUSTRALIA**

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This document has been prepared by D. Burnell, ABS Australia and will be presented under item 8 of the draft agenda

NON-FINANCIAL ASSETS: RECENT DEVELOPMENTS IN THE HOUSEHOLD BALANCE SHEET IN AUSTRALIA

1. Introduction

1. There have been recent initiatives by the ABS to improve Australian balance sheet estimates. By far the largest, in terms of its impact on the balance sheets, have been the improvements to measures of the value of the dwelling stock. Since most dwelling assets are held by households this has impacted mainly on the household sector.

2. Analysis by the ABS found that administrative by-product data used to value land (for taxation purposes) to be unsuitable for market value approximation. This had been an issue since the balance sheet was first compiled. However, it became noticeable in recent years due to accelerating market values in the dwelling stock during the 1990s. The new methods, implemented in 2006, are described below but are also discussed more extensively in the ABS feature article *Valuing Land and Dwellings Owned by Households*. A numerical example of the techniques used is also described in the ABS response to the OECD Land Survey.

3. Accurate measurement of land and dwellings is of paramount importance to estimation of reliable household sector performance ratios. The recent changes to land and dwellings impacted significantly on the ratio levels. This work facilitated the analysis and discussion of the household performance ratios in annual terms published earlier this year in the ABS feature article *Household Sector Balance Sheet – A National Accounts' Perspective*.

4. Land represents a significant share of the Australian household balance sheet, and the new methods impacted on stock levels significantly. Accurate measurement is of paramount importance to estimation of reliable household sector financial performance ratios. Recent changes impacted significantly on the ratio levels, and to a lesser extent, changes over time.

5. The ABS is also developing an experimental quarterly household balance sheet. Quarterly balance sheets will enable more timely and frequent analysis of various financial performance ratios, as well as extended measures of income, savings and wealth. Experimental results reveal significant volatility in some of the ratios. Also the impact of changes in real net wealth on some of the ratios is significant, and gives a much broader perspective to why households accumulate debt.

6. This paper covers two key themes in detail. First, a discussion about the recent improvements to land and dwellings, and some remaining issues. Second, some recent developments in the household balance sheet, including an experimental quarterly balance sheet. This latter work enables some analysis of quarterly household sector financial performance ratios, discussed at the end of this paper.

2.1 Land and dwellings estimates: methods

7. Previously, ABS estimated of the value of the stock of land and dwellings independently. Estimates of the value of land were sourced from state government Valuers-General departments. The data,

classified into residential, commercial and rural categories, were allocated to various sectors. The value of the stock of household dwellings was and continues to be estimated in the PIM.

8. Combined estimates of residential land and household dwellings provide an estimate of the narrower scope of households, i.e. excluding NPISH and unincorporated entities. This can then be compared to independently derived estimates on the same scope that is published by the Reserve Bank of Australia (RBA).

9. In the RBA method, the combined value of residential land and dwellings is derived by multiplying an average price derived from sales data supplied by a private sector contractor by ABS Census of Population and Housing data on the number of dwellings. The sales data provide broad geographical coverage, encompassing both metropolitan and non-metropolitan areas. The census data on the number of dwellings are comprehensive in coverage and include all houses, flats and units, both occupied and unoccupied, for all states and territories. Estimates of the number of dwellings are projected from the last census quarterly using building completions data and an estimate of demolitions. These estimates are revised when later census results become available. Results at the time of writing are extrapolated from the 2001 census but are soon to incorporate the results of the 2006 census.

2.2 Comparisons with alternative dwelling stock measures

10. Various estimates of the total household dwelling stock can be expressed on a per dwelling basis by dividing by the total count of the number of dwellings. This step assisted in evaluating the plausibility of the various estimates available because it is much easier to evaluate the average value of a dwelling than a very large aggregate. Further, the various real estate institutes express their indexes in dollar terms per dwelling, which helps to further aid in the comparisons.

11. On a per dwelling basis, ABS made the following three comparisons on 2003-04 data:

- Results from the ABS Survey of Income and Housing Costs (SIHC, catalogue No. 6554.0)
- RBA estimates of household dwelling stock (excluding NPISH and unincorporated entities)
- ASNA estimates of residential land and household dwellings (excluding NPISH and unincorporated entities)

12. An estimate of the mean value of dwellings owned by households of \$335,235 was derived from the SIHC, taking into account both owner occupied and tenanted dwellings and making the assumption that "other property" reported by households comprises dwellings and land. The RBA estimates were broadly supported by the results from the SIHC: the mean dwelling price estimated by the RBA for 30 June 2004 was \$348,787. By comparison, previously published comparable ASNA estimates were falling short, with only \$298,679 worth of stock per dwelling.

13. In addressing the shortfall, ABS reviewed land and dwellings separately to identify reasons for under-estimation. For dwellings, the level of the net capital stock hinges mainly on mean asset lives which are difficult to verify. Generally, various pieces of anecdotal evidence are required which when pieced together, can assist in forming a judgement as to whether capital stock levels are too high or too low. For instance, the Australian Housing Survey (AHS) (1999) assisted in verification of net capital stock in two ways:

- whether the composition of dwellings by type in the PIM was consistent with AHS results
- whether the average age of a dwelling in the PIM was consistent with AHS results

14. AHS results confirmed the composition of dwellings by type in the PIM was broadly consistent. However, AHS results also implied the mean life of non-house dwellings (such as flats and apartments) could be increased. Assigning the same asset life as for brick dwellings (from 58 to 88 years) boosted the stock levels and reduced the gap between ABS and RBA methods considerably.

15. Efforts then turned towards land for a more complete reconciliation. In principle, Valuers-General (VG) value land at market prices. In practice there are a number of difficulties in applying observed prices to the whole of the land stock. An example of the difficulties faced by VGs in all jurisdictions in this regard is illustrated by a recent report by the New South Wales (NSW) Ombudsman *Improving the quality of land valuations issued by the Valuer General* presented to the NSW Parliament in October 2005. This report pointed to systematic under-valuation of land in NSW. That under-valuation is reflected in ABS estimates of the value of land based on that source. The probable under-estimation of the value of land in all jurisdictions, in large part, accounted for the discrepancy between the previous estimates released by ABS and the implied value of land published by RBA.

16. The understated results were not surprising, for a number of reasons. By comparison with sales of house and land parcels, individual sales of land parcels are quite rare. Therefore VGs need to estimate the value of the dwelling in order to isolate the land component. Also, a number of measurement errors were present during the aggregation step. The NSW Ombudsman found that outdated sales data were usually not time adjusted for market trends. Furthermore, a technique of "mass valuation" was often used, a technique of borrowing strength from sales data to impute the value of land for the rest of the suburb. However for this method to be accurate, baseline information needs to be regularly updated. In many instances, the NSW Ombudsman found this was not the case. Finally, the valuation work is often contracted out and there are also incentives to value conservatively (undervalue) to avoid disputes and potential litigation with land owners.

17. The RBA avoids these measurement issues by applying prices (based on VG reported sales) to population census based estimates of dwelling stock, such that the problem of under valuation, which characterises the Valuers-General mass valuation approach, is avoided.

18. With the availability of plausible market values of the combined stock of residential land and dwellings in the RBA estimate, the ABS decided to adopt the combined value of land and dwellings. The value of the stock of land is derived residually, by deducting the value of dwellings estimated in the PIM from the RBA estimate. Estimates for the value of land include freehold and leasehold land in private hands, land owned by public trading corporations, and more recently, land held by the Commonwealth and State and local governments. To estimate land for the ASNA balance sheet, a matrix approach is used: land by type of use is allocated to institutional sector, as follows:

		Land by type of use			
		Residential	Commercial	Rural	Other
Land by institutional sector	Non-financial corps				
	Financial corps				
	Households				
	General government				

19. The estimation steps to allocating values of the stock of land to this matrix are quite detailed. An example using Australian System of National Accounts (ASNA) 2004-05 data is included in the appendix.

2.3 Some outstanding issues

20. Although ABS has made some recent significant improvements to the balance sheet, several issues remain:

- The RBA method assumes that properties traded are representative of the total stock of dwellings. However, the number traded represents a small percentage of the total stock. Bias may occur if the characteristics of the untraded stock differ. For example, is rental (investment) property traded more frequently and of lesser quality than owner-occupied?
- Sales data are based on contract date. However, the data are susceptible to systematic upward revisions due to lags between contract dates and settlement, and data do not become available until after settlement. To reduce that problem the dwelling price series is 'rated forward' using the growth rate in the ABS established House Price Index (HPI) for the two most recent quarters. This use of the HPI as an approximation can result in significant revisions to recent quarters. Since the dwellings net capital stock is a well behaved time series, volatility (and market bubbles) falls into the land component. Because of this, revaluations (holding gains) can be quite volatile, and contribute significantly to changes in net worth and extended measures of savings.
- The NSW Ombudsman made no findings for non-residential land. So although non-residential land valuations may also be conservative, ABS has no supportive evidence and estimates for non-residential land have not been adjusted. The ABS considers the incentives to undervalue will be less of an issue for non-residential land.
- Although the RBA method provides estimates of the value of residential land for Australia, ABS still continues to collect VG residential land for each state so that it can be used as a proportional allocator. That is, ABS expect VGs in the other states to be facing similar problems with valuation, and adjust all states by the same proportion. In the longer term, this approach to estimating state level estimates of stock is not ideal.

3.1 Household Balance Sheets

21. While capital stocks of fixed assets, financial assets and inventories have been available for some time, it was not until the mid-1990s that the ABS first developed a National balance sheet. This was due mainly to a significant undertaking to develop experimental estimates of natural resources such as forests, land, and subsoil assets. In aggregate natural resources contribute significantly to the balance sheet in Australia. However, their valuation remains a difficult and contentious undertaking. The methods used to estimate balance sheets, accumulation accounts and in particular, natural resources were described in the 1995 ABS occasional paper *National Balance Sheets for Australia, Issues and Experimental Estimates 1989 - 1992*.

22. Australian balance sheet estimates were extended to sectoral level and were published in the System of National Accounts (5204.0) a few years after the release of the 1995 occasional paper, with annual estimates going back to June 1989. Most of net worth is held by the household sector, and the dwelling stock (house and land) comprises more than half of total assets in this sector. Recently, the ABS has focused on improving the estimates of the dwelling stock, particularly land. The new estimates of the household dwelling stock and comparisons with financial assets and liabilities have recently come into focus, particularly as improvements to the dwelling stock have facilitated estimation of more credible household performance ratios. Examples include mortgage to real estate assets and debt to liquid assets ratios.

3.2 Definition of the household sector

23. The Australian System of National Accounts (ASNA) definition of the household sector includes persons, unincorporated businesses and non-profit institutions serving households (NPISHs). NPISHs are included as households because data are not available to identify their activities separately. The inclusion of unincorporated businesses and NPISHs often does not sit well with more social type analysis of household well-being on the narrower definition of households. Care must be taken understanding differences in scope when comparing the various household indicators published.

24. The ABS has a research program to separately identify NPISHs. This will facilitate more compatible social type analysis of household well-being with national accounts measures. Since household surveys provide very detailed information about characteristics, activities and behaviours of households, linking this information to macro level information of the same scope is highly desirable for augmented social analysis

3.3 Assets measured

25. For the Australian household sector, about one quarter of total assets are fixed assets estimated using the perpetual inventory method (PIM) and they include:

- Dwellings - brick; timber; alterations & additions; and other dwellings
- Non-dwelling construction
- Machinery and equipment - Road vehicles; computers; industrial; electrical; other transport; other machinery and equipment
- Software - In-house & customised; and purchased (off-the-shelf)
- Artistic originals - Literary; film; and music
- Livestock fixed assets - Beef breeding stock; dairy cattle; sheep

26. Non-produced assets in the household sector, representing nearly 40% of total assets are almost entirely comprised of land. Other kinds of significant non-produced assets reside in other sectors. In this regard, compiling a full balance sheet for households is less problematic than for other sectors.

27. To complete the household balance sheet, financial assets are grouped into the following instruments:

- Currency and deposits
- Securities other than shares
- Loans and placements
- Shares and other equity
- Insurance technical reserves
- Unfunded superannuation claims
- Other accounts receivable

28. Household liabilities are grouped as follows

- Securities other than shares

- Loans and placements
- Other accounts payable

29. Finally, the ABS also records the memorandum item, consumer durables, which also belongs to the household sector.

3.4 Analytical opportunities

30. For the ABS, analytical opportunities have increased considerably due to improvements to the estimates of the dwelling stock and work on an experimental quarterly household balance sheet. Three key analytical products are envisaged:

1. Balance sheets and accumulation accounts
 - Household measures of assets, liabilities and net worth
 - Flow accounts comprising net transactions, neutral and real holding gains, and other volume changes
2. Household performance ratios including:
 - *Interest Payable to Year end Income*: The proportion of household disposable income required to meet interest payments.
 - *Debt to Year end Income*: The proportion of income needed to repay all debt
 - *Mortgage Debt to Residential Real Estate*: The extent to which real estate assets are geared
 - *Debt to Liquid Assets*: Ability of households to extinguish debt in a short period of time using readily available liquid assets
 - *Debt to Assets*: An indication of the extent to which the household balance sheet is geared/dependent on debt
 - *Net Worth to Income*: An overall balance sheet "health" indicator, taking into account the relative growth in assets and liabilities relative to income growth

31. In Australia, there has been considerable interest in analysing household sector performance ratios. In particular, a key interest in recent accelerating market values of the household sector dwelling stock and increased household debt. For many years, the RBA has published a range of household performance ratios on a quarterly basis. With the new estimates of the household dwelling stock, the ABS was also able to publish compatible ratios in annual terms in the feature article, *Household Sector Balance Sheet – A National Accounts' Perspective*.

32. A full quarterly balance sheet enables further isolation of the effects of net economic transactions and holding gains on various ratios. Also, they can be compared to other ratios published by the RBA, to obtain a more comprehensive picture of the "health" of the household sector.

3. Analytical measures of household income, saving and wealth
 - GDI augmented by real holding gains and other volume changes to obtain a measure of income plus changes in real net wealth

- Income plus changes in real net wealth adjusted to remove HFCE and COFC to obtain savings plus changes in real net wealth. This measure can be further adjusted by treating consumer durables as if they were capital, consumed slowly over the life of the asset

33. The extended measures above are complimentary to the standard methods used on analysis of household savings ratios, particularly as international evidence indicates that changes in real wealth impact upon household spending behaviour. For Australia, Dvornak & Kohler (2007) found that a permanent increase in \$1 of wealth contributed to additional household spending behaviour of 6-9 cents in the dollar.

4.1 Quarterly household balance sheets

34. Although the contribution of holding gains relative to transactions can be seen in an annual balance sheet, a quarterly balance sheet (QBS) allows these effects to be monitored more frequently and in a more timely way. Given the magnitude and volatility of holding gains, isolation of these two effects on a quarterly basis provides invaluable insights to changes in net worth. A quarterly balance sheet also facilitates the generation of related tables for adjusted wealth, income and savings and more timely and frequent performance ratios.

35. As a first step, ABS has compiled an experimental QBS for the household sector. Experimental estimates are available for the last 17 years, beginning September qtr 1989.

36. Quarterly indicators of non-financial assets need to be benchmarked to the ASNA. This benchmarking is similar to the way the quarterly national accounts are benchmarked to supply-use tables:

- First, an unbenchmarked QBS is compiled using the best available flow indicators for GFCF, COFC, price indices and other volume changes.
- Second, the QBS is benchmarked to the annual household balance sheet, forcing the June quarter closing position to agree with published estimates in the ASNA (5204.0).
- Third, the QBS is extrapolated using quarterly indicators of net transactions and prices to reach the latest quarter. The quality of the indicators appears to be very good which means that significant revision is not expected when a new benchmark is reached (see charts below).

37. The benchmarking procedure attempts to adjust the level of a quarterly series to that of an annual (benchmark) series while seeking to minimise changes to the growth rates in the indicator quarterly series.

4.2 Measurement issues

38. Some asset classes are not suitable for the above algorithm and need to be treated individually to obtain plausible results:

1. Land: As a non-produced asset, no transactions are recorded. A key requirement is for the availability of a land price index needs to be derived to solve for the holding gains. This index is derived as an implicit price deflator by modelling growth in the volume of real land. See appendix for details.
2. Livestock: In the quarterly national accounts, price effects are only recorded in the September quarter. Therefore benchmarking is more limited than in the usual case so that price effects are not redistributed into periods where they are not expected to occur.
3. Equipment deflator: Asset prices need to represent the composition of the stock rather than the flows. This becomes an issue for heterogeneous asset classes such as machinery and equipment, where the stock and flow composition can vary considerably due to the different asset life

assumptions used. It was found that the growth rate in the net capital stock deflator for equipment is quite different to the investment deflator. The different growth rates are due to application of different asset lives of the underlying 6 equipment types. In the net capital stock, longer lived equipment types, such as motor vehicles, take on more weight, and shorter lived assets, such as computers, take on less. This explains why deflator declines are more modest in the net capital stock than in the investment deflator.

4.3 Extrapolation from latest annual point to the latest quarter

39. The accuracy of extrapolation depends to a large degree on the quality of the indicator, as indicated by how much it has changed due to annual benchmarking. For dwellings, which is the main produced asset, the indicator series is very good and not much revision is expected to align the quarterly data when the next annual data point is reached. Similarly, for land, the other key non-financial asset, accuracy is maintained by the accuracy of the dwellings extrapolation, as the other dependency is the RBA dwelling stock, which is generally subject to minor revisions. For financial assets and liabilities, no extrapolations are required, because the stock of financial assets and liabilities are already recorded each quarter.

4.4 Holding gains

40. For about five years, the ABS has been partitioning holding gains into neutral and real holding gains, according to SNA guidelines. This partition facilitates the analytical measures of household income, saving and wealth. ABS publishes these analytical measures for both national (all sectors) and for households in the *Australian System of National Accounts (Cat. 5204.0)* in Tables 21 and 48 respectively.

41. Generally, the SNA expresses nominal holding gains in terms of an opening balance sheet position and an asset price. For example, nominal holding gains are expressed as:

$$G = (p_t - p_o)q \quad (1) \quad (\text{SNA para 12.69})$$

where G is the nominal holding gain, $p_t - p_o$ is the asset price change and q is the opening balance.

42. More recently, this partition was reviewed in the context of experimental quarterly household balance sheets. To achieve consistency in the holding gains for quarterly (summed to an annual total) and annual household balance sheets, ABS found that holding gains on net transactions and volume changes through the period need to also be captured in the holding gain formula. ABS found that net transactions are captured to a greater extent in the opening position when balance sheets are recorded more frequently, and that these transactions need to be taken into consideration when partitioning holding gains .

Based on this work, the ABS is adopting a modified form of (1) as follows:

$$G = \Delta p(O + 0.5 * [T + V]) \quad (1a)$$

where Δp is the asset price change ($\Delta p = p_t/p_o - 1$), O is the opening balance (current prices), T is net transactions and V is other volume changes. Total holding gains on transactions and other volume changes are calculated for half of the period, assuming mid-period purchase/appearance.

43. Similarly, to achieve consistency, ABS found the SNA approach needed to be amended to capture neutral holding gains on flows. So, instead of:

$$NG = p_o q (r_t/r_o - 1) \quad (2) \quad (\text{SNA para 12.76})$$

where $p_o q$ is the opening balance and r_t/r_o is the general price change, ABS proposes

$$NG = \Delta r(O + 0.5 * [T + V]) \quad (2a)$$

where Δr is the general price change

44. Furthermore, real holding gains can be derived residually, as prescribed in the SNA, as (1) - (2):

$$RG = G - NG \quad (3)$$

or as

$$RG = \Delta a(O + 0.5 * [T + V]) \quad (3a)$$

where Δa is Δp minus Δr , or price effects in excess of general price change.

45. Equations 1a, 2a and 3a are very similar, only the price term is different. This allows 1a to be re-expressed in terms of the neutral and real price effects:

$$G = (\Delta r + \Delta a)(O + 0.5 * [T + V]) \quad (4)$$

which is the same as

$$\begin{aligned} G &= NG + RG \\ G &= \Delta r(O + 0.5 * [T + V]) + \Delta a(O + 0.5 * [T + V]) \end{aligned} \quad (5)$$

46. Consistency between quarterly and annual results is achieved if holding gains on transactions and other flows are captured. Presently, the SNA ignores neutral holding gains on flows due to net transactions and other volume changes. Therefore ABS found it to be unsuitable for consistent quarterly and annual holding gain partitions. The result can be described as follows for positive general price change: The more (less) frequent the balance sheets, the higher (lower) the neutral holding gains, and the lower (higher) the real holding gains.

47. The modified expressions are necessary to derive consistent changes in real wealth measures more frequently. There is considerable interest in quarterly measures as the impact of real holding gains can be quite significant in a quarter, especially for shares and dwelling stocks. The ABS experience suggests SNA guidelines on holding gains could be reviewed to increase the clarity of the discussion.

48. ABS also suggests reviewing the SNA notation and text describing holding gains in elemental terms. Opening balances are generally valued in current prices. Since it is not necessary to isolate price and volume components to solve for the holding gains, the notation can be simplified.

4.5 Experimental results for selected household sector assets

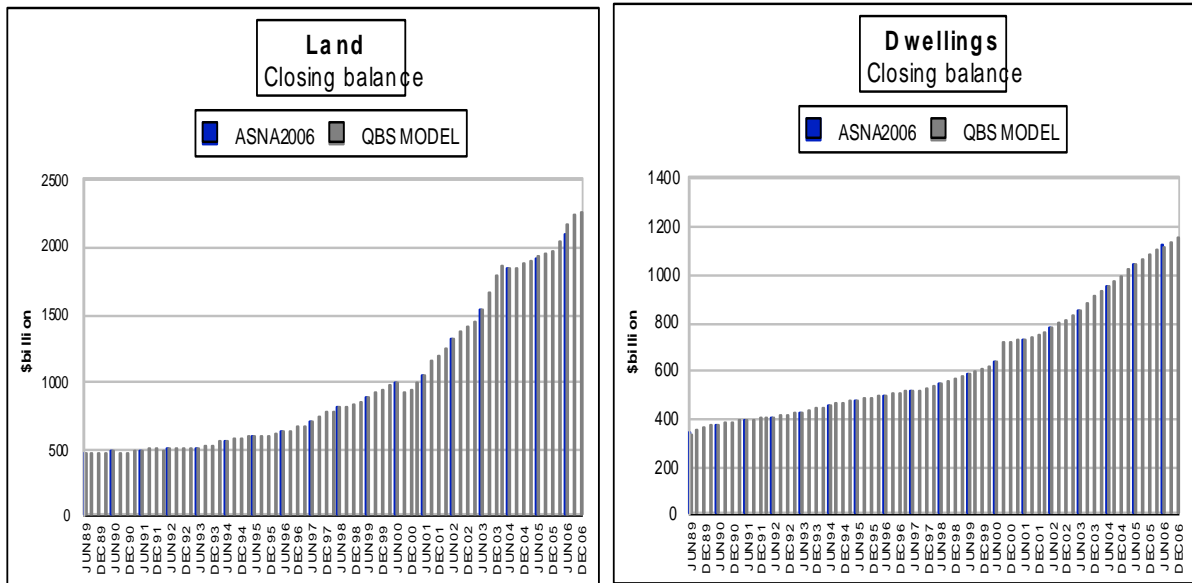
Stock of household land and dwellings

49. From June 1989 to June 2006, household land stocks grew at an average annual rate of 9%. However, since June 2000, growth has accelerated to an average rate of 13%, annually. Over the same period, dwellings stock grew at 7% per annum on average but also accelerated to 10% per annum on average since June 2000. The quarterly balance sheet also shows some additional information:

- Noticeable accelerations and decelerations of land values, because holding gains, especially real holding gains, change dramatically from quarter to quarter. The acceleration between 2001 and 2003 was particularly strong.
- The introduction of the new tax system in September 2000 impacted strongly on dwellings, mainly through price effects, but this was mostly offset by falls in land. This result is unexpected. Between June and September 2000, the RBA dwelling stock only grew by 0.8%,

however dwellings as modelled in the PIM grew by 13%, with a one-off price effect of 10%. Using the PIM method, ABS revalues of the entire stock of dwellings based on price indexes for new dwellings built. However RBA dwelling stock results suggest these one-off price effects were limited to just new dwellings, rather than the dwelling stock as a whole.

- The impact of the new tax system appears to have had a temporary impact on the dwelling stock levels over the subsequent three quarters since the introduction of the new tax system, with dwelling prices remaining quite flat.



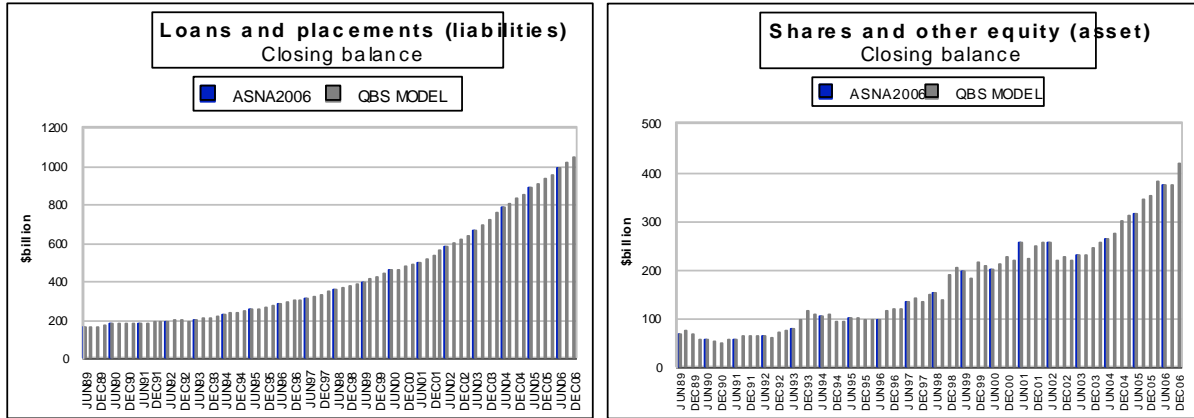
Loans and placements (liabilities)

50. Financial assets and liabilities do not need to be modelled in the QBS, because quarterly data are available and published.

51. The stock of loans borrowed by households is not subject to quarterly volatility. The graph however indicates a gradual acceleration over time.

Shares and other equity

52. This asset is very subject to market volatility, mainly due to revaluations. Quarterly data reveals that between December 1998 and March 2002, share prices exhibited more volatility than usual. Significant losses occurred in September 2002, which has been more than offset by a strong recovery since then.

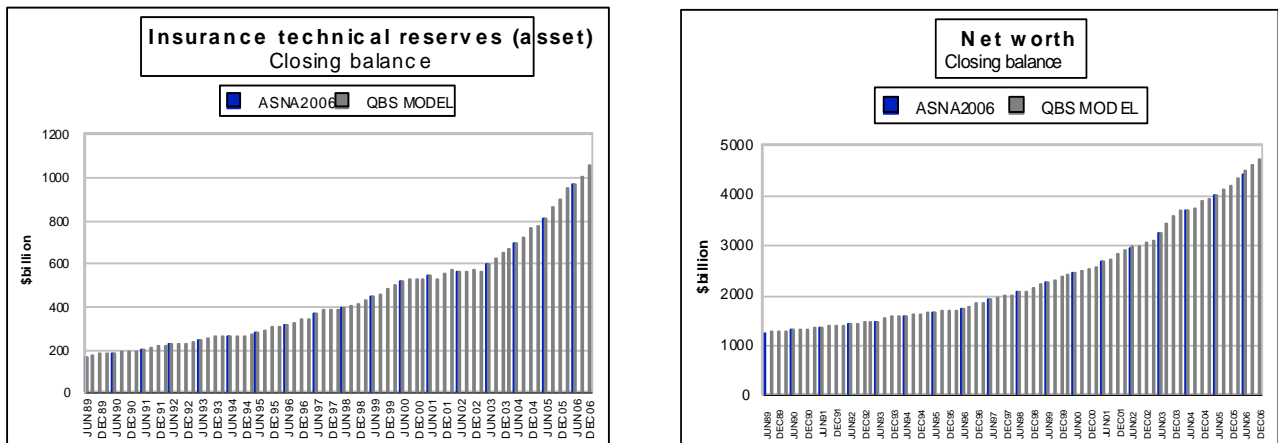


Insurance technical reserves (asset)

53. Strong average annual growth of 11% since June 1989, but has accelerated to 18% since June 2004. The recent accelerations can be mainly attributed to revaluations, in large part due to strong returns in the equity market. Quarterly data indicate stronger than usual volatility in 2001 and 2002, also due to revaluations, reflecting share market price instability at the time.

Net worth

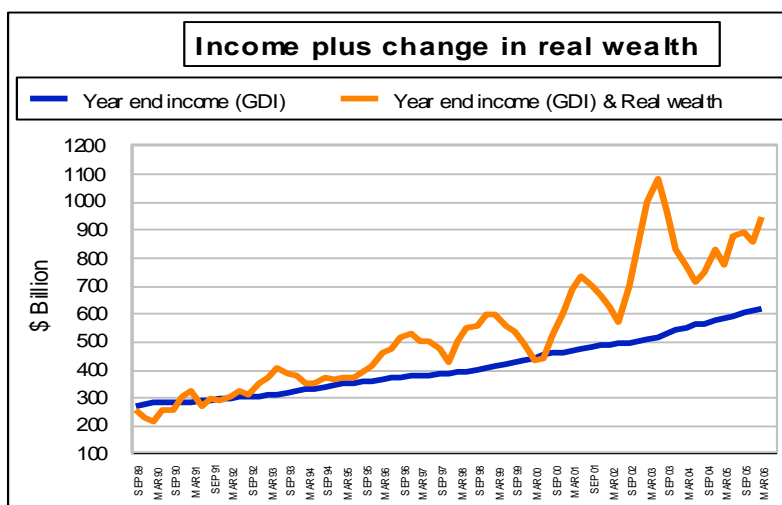
54. An average annual growth of 8% since June 1989 has accelerated to 10% since June 2000. Quarterly balance sheets indicate quite a steady behaviour through the year although the impact of recent growth in the dwelling stock is clearly visible.



Income plus changes in real wealth

55. Household sector real holding gains and other volume changes, net of real holding gains on liabilities form the basis of changes in real net wealth. By comparison with year end income, they exhibit significant volatility. In March 2004, at \$1080b, it was more than double the year end GDI. At other times, year end changes in real net wealth may add little or even subtract from income, such as recently as March 2001.

56. Most of change in real net wealth is unrealised, due to holding but not selling the asset. However households may feel more wealthy, and this can impact on their investment, saving and consumption behaviour. To the extent that much of the stock is not traded, erratic values should not be taken in isolation, but rather in the context of neighbouring wealth effects as well.

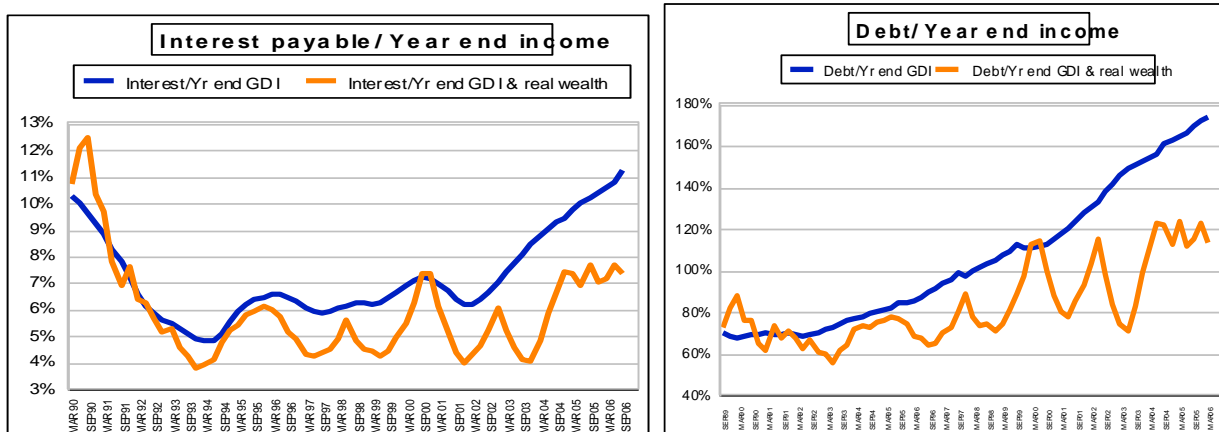


4.6 Household performance ratios

57. The first two performance ratios overlay the effects of changes in real net wealth. Two key effects are:

- marked increases in volatility to due quite variable real holding gains
- moderation of upward trend

58. The second point, helps to illustrate that when changes in real net wealth are considered, the holding of assets offers significant collateral against interest payments or debt. Much of debt and hence interest, relates to debt incurred to purchase assets. The extended measure of income helps to interpret the increase in the ratio in the light of increases in assets over the period, which can be disposed of to repay debt.



Mortgage debt to residential real estate ratio

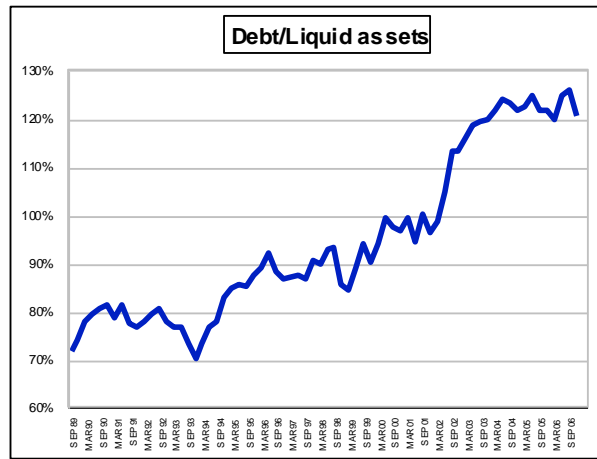
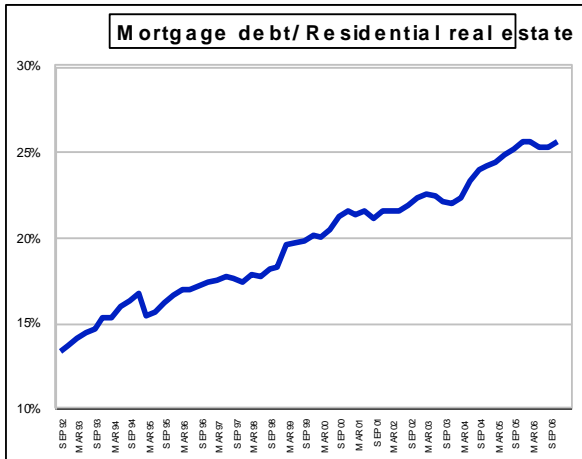
59. This graph shows to what extent households' real estate assets are geared. Since September quarter 1992, the ratio has doubled to 26%. Although mortgage debt grew faster than real estate owned over the period, it is useful to put the changes in the ratio in the context of dollar values. Since June quarter 2000:

- Mortgage debt rose from \$309b to \$805b, an increase of \$496b (161%)
- Real estate assets rose from \$1507b to \$3142b, an increase of \$1635b (108%)

60. So although the ratio indicates steadily increased real estate gearing, since June quarter 2000, for each dollar of mortgage debt, households acquired more than \$3 worth of real estate assets. As well as increased real estate debt serving to purchase more dwelling stock, mortgage loans is increasingly used for purposes other than housing as well, due to households' increased ability to use their home loan to finance other kinds of purchases such as durable household goods, motor vehicles, and shares.

Debt to liquid assets ratio

61. This graph reflects to ability of households to extinguish debt in a short period of time using readily available (liquid) assets. Liquid assets are currency and deposits, securities, loans and shares and equity. On a quarterly basis, this ratio is quite volatile. Also, the ratio has increased markedly, especially since June 2002. A feature of this ratio is that, since 2002, liquid assets have become insufficient to extinguish all household debt, meaning an increased reliance upon so called "illiquid" assets. The sharp acceleration in the ratio in mid-2002 is due to increases in debt mainly to finance illiquid assets such as dwellings, rather than shares and equity. However, the acceleration needs to be considered in the context that financial innovation has made it easier to access capital gains from housing wealth.

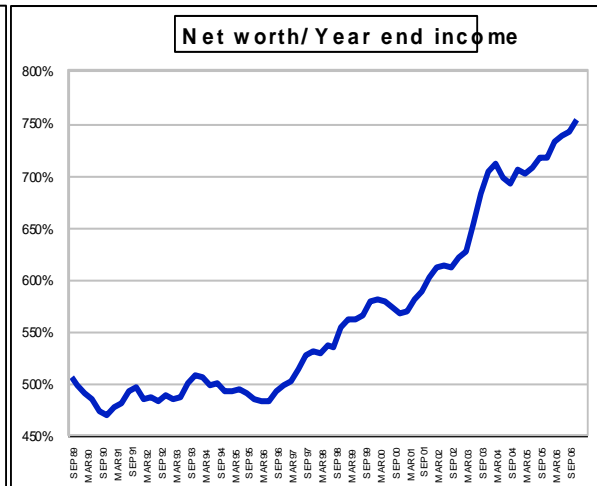
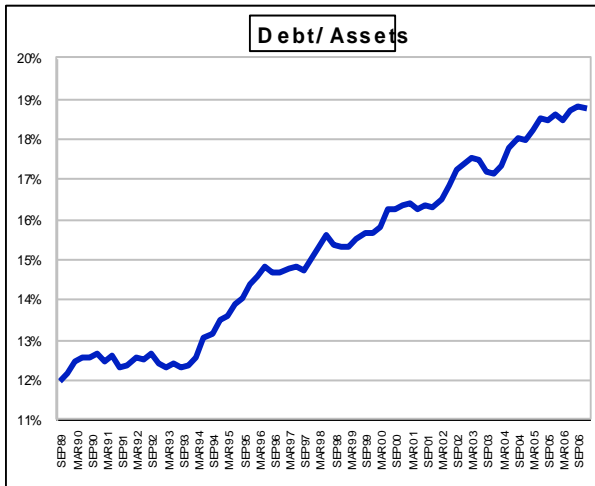


Debt to assets ratio

62. This ratio provides an overall gearing of the household balance sheet, the degree to which assets depend on debt. Most of debt is loans and placements, a well behaved stock, so the volatility in the ratio is caused by the assets, namely revaluations. The ratio has been trending upward. For every \$100 of household assets, there is now about \$19 worth of debt held, compared with \$12 of debt in September 1989.

Net worth to year end income ratio

63. An indicator of the overall long term health of the balance sheet, taking into account the net effect of assets and liabilities to growth in income. It shows that the growth in the value of total assets continued to outpace household debt and disposable income. Net worth has now reached 750% of year end disposable income.



5. Conclusion

64. Recent improvements to estimates of the combined value of the stock of land and dwellings have resulted in much higher balance sheets estimates, impacting mainly on the household sector. The earlier approach contained significant measurement error, due to extensive reliance upon model based estimates, not validated by observed market values. This underscores the importance of using market observed values

where possible. Better capturing the value of total assets, especially for the household sector, has improved the estimate of net worth and enabled the compilation of more accurate and reliable financial performance ratios for this sector. These ratios can be complimented by estimates of changes in real net wealth to better illustrate why households' accumulate debt, and why this has accelerated. Changes in real net wealth moderate upward trends in debt to income ratios, but at the same time add significant volatility.

65. Analysis of the balance sheet, financial performance ratios, and extended measures of income and wealth have benefited from the development of a quarterly household sector balance sheet, which allows for more frequent and timely analysis. Experimental results show that some ratios exhibit significant volatility, particularly due to holding gains recorded for land and shares and equity. Some interesting recent trends include debt exceeding the available liquid assets to extinguish debt quickly, and generally households' increased gearing in order to expand asset holdings.

APPENDIX

Estimation of the value of the stock of land

The steps below contain Australian data in respect of 2004-05, intended to aid in the description of methods used.

1. A total household dwelling stock (house & land) at market value (eg \$2721.5b) is derived by the Reserve Bank of Australia (RBA Bulletin Table B20), using counts of all dwellings (occupied and unoccupied) from the Census of Population and Housing. Censuses are conducted every 5 years, the latest in respect of 2006. For inter-census years, dwelling census counts are extrapolated forward using dwelling completions, net of demolitions. This result is then multiplied by the mean market value of dwellings, the latter value compiled by a private consultant. Valuers General data are a key input into the estimate of the mean value of dwellings.
2. ABS subtract the current price net capital stock of dwellings (eg \$1038.5b) for households from the RBA dwelling stock estimate (\$2721.5b) to obtain household residential land as a residual (\$1683b).
3. For all residential land, the total RBA household dwelling stock (house & land), is inflated by assuming that 92% of the census count represents the household sector (including unincorporated & NPISH) such that 8% belongs to other sectors: $\$2721.5/0.92 = \$2958.2b$. Then $\$2958.2b$ less $\$2721.5b = \$236.7b$ to be allocated to sectors other than households.
4. ABS subtracts the current price net capital stock of dwellings for all sectors (\$1086.2b) from residential land, all sectors (\$2958.2b) to derive total residential land (\$1872b).
5. The difference between total (\$1872b) and household residential land (\$1683b) is allocated to Non-financial corporations & General government (\$189b). Financial corporations are assumed not to hold residential land as there are no dwellings allocated to this sector.
6. Commercial and Rural land is supplied by Valuers general for each state and territory. ABS allocates these national aggregates to institutional sectors using various proportional indicators such as the ratio of land to structures.
7. Other land which is comprised mainly of crown land (\$133.2b) is derived using Public Finance data for General government land (\$144b), after deducting a small proportion to be allocated to Government residential land (\$10.8b). Because they often reside in significant locations, Government residential land is assumed to be three times the value of Government dwellings net capital stock.

The results of the above steps can be summarised as follows:

2004-05 (\$billion)		Dwellings	Land and dwellings combined	Land by type of use			
				Residential	Commercial	Rural	Other
Land by institutional sector	Households	1038.5	2721.5	1683.0	40.7	191.4	0.0
	Non-financial corps	44.1	223.2	178.2	138.4	16.6	0.0
	Financial corps	0.0	0.0	0.0	24.4	0.0	0.0
	General government	3.6	13.5	10.8	0.0	0.0	133.2
	All sectors	1086.2	2958.2	1872.0	203.5	208.1	133.2

Pricing issues

While constant-quality price indexes are available for the various kinds of building construction activity, no such equivalent price index is available for land. For the real national balance sheet, ABS gets around this price gap by modelling the growth in the volume of land as a proportion of the growth rate in the real net capital stock of overlying structures. A similar approach is also used by the US BLS. For Australia, the ratios used are 1/2 of the growth rate of non-dwelling construction and 1/3 of the growth rate of dwellings plus a constant for rural land (assuming that rural land degradation and improvements from clearing etc net out to zero).

Therefore, it is possible for the ABS to derive an implicit price deflator for dwellings and land stock combined on this basis. However, in the absence of good knowledge about land reclassification to better quality land and other improvements, ABS is not sure whether the modelled proportions used to derive the growth rates for real land are accurate. Although they appear to be plausible, they are difficult to verify.

On the other hand, several non-constant quality house and land price indexes are available from ABS and non-ABS sources. They include the ABS established house price index (HPI); house price indexes compiled by various real estate institute peak bodies, major banks, and private consultants. Generally they are the average of house sales reported. While these indexes might be suitable for applying a census count of dwellings to derive a current price wealth or net stock aggregate, they are generally unsuitable for volume estimation, due to the unknown quality change over time.

Under the RBA approach, the sales data that form the basis of the household dwelling stock are based on prices as at the dates contracts are signed (contract dates), which give an accurate indication of market prices at the time. However, the data are susceptible to systematic upward revisions because there can be lags of several months between contract dates and actual settlement of the contract, and data do not become available until after settlement. To reduce that problem the dwelling price series is "rated forward" using the growth rate in the HPI for the two most recent quarters. Prior to 1998 RBA used a number of different dwelling price sources, which were spliced onto the data, using growth rates, to create a continuous series going back to 1960.

At various points in the RBA price series, the average value of a dwelling is represented by either a mean or median price, which brings to question which "average" is more suitable. In any given year, the sales information collected is based upon a turnover of approximately 6% of the total stock of dwellings, so it is important for the average to be as representative of the stock as possible.

Since the mid-1990s the RBA average price has been based on means rather than medians. The RBA's analysis indicates that the distribution of dwelling prices is positively skewed, resulting in a downward bias in the estimate of dwelling wealth when the median is used.

In the case of the capital cities mean prices exceed median prices by a large amount, particularly in Sydney, where there is a big range in property prices. High priced properties are a feature of the market and they can have a significant effect on mean prices. In June quarter 2004 the mean price in Sydney exceeded the median by 33 percent (see table below).

	All residential sales, city wide (\$'000)							
	June quarter 2004							
	Adelaide	Brisbane	Canberra	Darwin	Hobart	Melbourne	Perth	Sydney
Median price	240	325	338	198	215	325	252	448
Mean price	294	368	371	211	252	399	287	594

In general the mean provides an unbiased estimate but may be subject to greater variance than the median because it is more sensitive to outliers, i.e. sales at the top-end of the market place captured in the 6% turnover (sample), which are not representative of the vast majority of untraded stock.

An alternative price series that might be used is the HPI which favours the use of median prices. The difference in choice is due to different objectives: in the HPI ABS is trying to estimate a robust price change and the median is regarded as a more robust measure where large outliers are a feature of the data, as is the case for some capital cities. However, when evaluated as a potential step to estimation of the dwelling stock, the HPI was found to be less than ideal, when compared to the RBA method. Two key reasons are:

- the use of medians rather than means. Other things being equal, this would result in an understated aggregate, due to the observed skewness; and
- the scope of the HPI is at present too narrow for balance sheets: it covers only free-standing house and land packages as opposed to all dwelling types, and has capital city only coverage. This issue would cause the value of the stock to be overstated when applied to a census count of dwellings because land values in capital cities are generally higher than in regional areas.

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