

Estimating household-sector wealth in South Africa

by J Aron, J Muellbauer and J Prinsloo¹

1. Introduction

Substantial changes in equity values and the value of residential real estate over the past decade have generated new interest around the world in the potential influence of household-sector wealth on the final consumption expenditure of private households (Aoki et al., 2002; Boone et al., 2001 and Catte et al., 2004). This is equally true in South Africa. Final consumption expenditure by households relative to gross domestic product rose from an average of 56 per cent in the 1980s to an average of 62½ per cent between 1990 and 2005. By contrast, gross saving as a percentage of gross domestic product declined from an average of 24½ per cent during the 1980s to only 16 per cent on average between 1990 and 2005. Likewise, gross saving by the household sector relative to gross domestic product declined from 6½ per cent to 3½ per cent on average during these respective periods. Household balance sheet evidence is likely to help explain these phenomena; see Aron and Muellbauer (2000a) and Prinsloo (2000) for more detailed discussions.

Official balance sheet estimates for the household sector are not currently available in South Africa, as is the case with many emerging-market and most developing economies (see OECD, 2004, for the availability among OECD countries). Yet with South Africa's well-developed financial sector and deep capital markets, asset-market channels are likely to be important in the determination of aggregate consumer spending and saving, consumers' demand for credit and their broad money holdings. The incorporation of household balance sheet aggregates in macroeconomic models could improve the modelling of expenditure, inflation, debt and the like, thereby enhancing analysts' understanding of economic behaviour and policy-makers' attempts to find the most appropriate policy settings. Household balance sheets are also required for an assessment of the distribution of wealth and liquidity. This motivates the effort to construct time series of market value data for the main components of household-sector wealth.

This brief article aims to highlight recent research on estimates of household balance sheets for South Africa. A more comprehensive exposition of the research on households' balance sheets will be published in a forthcoming Working Paper of the South African Reserve Bank by the same three authors.

The net wealth estimates obtained from the household-sector balance sheet are derived with quarterly frequency utilising the measures constructed in Aron and Muellbauer (2006a). The main balance sheet categories distinguished are tangible assets and financial assets – the latter including both liquid assets and various categories of illiquid financial assets – and, on the other side of the balance sheet, household debt and net worth.

The historical data for liquid assets and long-term insurers from 1975 to the early 1990s were constructed using the methodology in Aron and Muellbauer (2006a), as were private pensions up to 1998. The methods rely, where relevant, on accumulating flow-of-funds data using appropriate benchmarks and, where necessary, converting book to market values using appropriate asset price indices. Thereafter these estimates are linked to data published in the *Quarterly Bulletin*. For ordinary shares, government and corporate stocks and official pension funds, these methods provide data up to 2003.

Debt estimates and comprehensive estimates of tangible assets for households and unincorporated businesses were mainly compiled using money and banking, and national accounts statistics obtained from the Bank.

¹ Dr Aron is from the Centre for the Study of African Economies, Oxford University; Prof Muellbauer from Nuffield College, Oxford University; and Mr Prinsloo from the Research Department, South African Reserve Bank. The authors are grateful to M Kock and D Meyer of the South African Reserve Bank for data discussions. This collaborative research was funded by the Department for International Development (UK), grant number R8311 and the South African Reserve Bank. The UK Department for International Development (DFID) supports policies, programmes and projects to promote international development. DFID provided funds for the study as part of this objective but the views and opinions expressed are those of the authors alone. A similar disclaimer applies in respect of the South African Reserve Bank's provision of resources towards this study. See also <http://www.csae.ox.ac.uk/> and link to "The South African Macroeconomic Research Programme".

The balance sheet measures exclude assets from some important areas. The first is household-sector ownership of foreign assets, the acquisition of which was made difficult or illegal by South Africa's capital controls, that have been progressively relaxed since 1995. The second is some of the financial assets of unincorporated businesses, and ownership of corporations not publicly quoted on the stock exchange. In common with other countries' published estimates of household wealth, the present study also excludes the value of social security-related benefits. Nevertheless, the assets and debts included in the estimates are measured with reasonable accuracy and capture the main components of wealth relevant for consumer spending and portfolio decisions by South African households.

An overview of the data sources and methodology is presented in Section 2. Section 3 deals with the trends in wealth and liabilities displayed by the estimated balance sheet data for the household sector in South Africa, and Section 4 concludes.

2. The estimation of household balance sheet aggregates

The first part of this section explains the data sources and methodology for estimating the value of fixed and financial assets of the household sector. The second part addresses the liability side, particularly the main components of household debt, namely mortgage advances and other credit extended to households.

2.1 Assets

2.1.1 Tangible assets

The fixed or tangible assets of households comprise the market value of residential buildings and the capital stock (derived from fixed capital formation, and the book value of inventories) of unincorporated business enterprises.

Residential buildings and land

The asset value of residential buildings owned by households, including unincorporated business enterprises in the agricultural sector, is derived from the existing capital stock at constant values using the Perpetual Inventory Method (PIM). The capital stock at constant prices for private dwellings² is inflated by an average house price index³ obtained from one of the larger banks, Absa. These calculations provide a fairly reliable proxy of the market value of residential buildings owned by households.

The land value of residential property is calculated, using an average ratio of the land value for existing and new houses relative to the purchase prices of the buildings excluding the value of the land. An average ratio of 32,7 per cent was obtained from unpublished surveys conducted by Absa between 1966 and 2004.

Non-residential buildings and non-residential land

Unfortunately, the asset value of fixed investment of non-residential buildings and other fixed assets by unincorporated business enterprises can only be estimated indirectly. By the use of the information obtained from the Economic Activity Surveys (EAS) per industry, conducted annually by Statistics South Africa since 1998, it is possible to make a split between incorporated and unincorporated business enterprises. Fixed ratios (per

² Note that since private dwellings include some residential rented property owned by corporations, pension funds and non-residents, this will overstate the ownership by the household sector.

³ The average house price index is based on the total purchase price of houses, comprising small, medium and large houses within a range of 80 – 400m². The index covers all nine provinces.

industry) as calculated by the National Accounts Division of the Bank from the most recent EAS surveys, are applied to capital stock data⁴ obtained from the National Accounts Division, to allocate a certain portion of fixed assets (per industry) to the household sector.

⁴ The capital stock data are based on the PIM of non-residential buildings and other fixed assets in the private sector.

There are no appropriate official price indices to define market values, so the stock of non-residential buildings at constant values is inflated by a derived price index of the market value of non-residential buildings. This annual index from 1974 is calculated from rental values and capitalisation rates of industrial buildings, offices and shopping centres in the larger metropolitan areas.

The value of the land (in the case of non-residential property) is estimated from unpublished balance sheet ratios calculated from the 2002 EAS. The ratio of the book value of land relative to non-residential buildings for the various industries (excluding agriculture) – which is estimated at an arithmetic average of about 14 per cent – is applied to the derived market value of non-residential buildings of unincorporated business enterprises, to obtain an approximate value of the land.

Other fixed assets

Estimates of the replacement value (a proxy for market value) for vehicles, plant and machinery, construction works (structures) and cultivated assets recorded in the balance sheet of the household sector are derived from net capital stock measures (calculated using the PIM per industry, as compiled by the National Accounts Division of the Bank). The allocation of the asset value of these types of assets is derived using the ratios between incorporated and unincorporated enterprises by industry, as discussed above, from the EAS.

Likewise, these ratios are also used to obtain a split of the market value of inventories between incorporated and unincorporated enterprises. The value of inventories is available from quarterly surveys conducted by Statistics South Africa.

2.1.2 Financial assets

The financial assets incorporated in the calculation of wealth estimates for households in South Africa are deposits with banks and mutual banks, interest in pension funds and long-term insurers, participation mortgage bond schemes, unit trusts, equities, as well as government and public-enterprise stocks and corporate bonds. In addition, an assumption regarding the value of coin and banknotes in possession of the household sector (i.e. in circulation outside the monetary sector) is also included. Unfortunately, only limited information exists on individual ownership of foreign assets and only for recent years; these have been included in the balance sheet estimates.

Liquid asset stocks

Household liquid asset data include deposits of individuals, unincorporated enterprises and non-profit organisations with banks and mutual banks, the Postbank and the Land and Agricultural Bank. It also includes deposits with non-monetary financial institutions. These deposits cover the entire maturity spectrum; from cheque and transmission accounts to long-term fixed and notice deposits.

5 The published data are augmented by some unpublished information; see Aron, Muellbauer and Prinsloo (2006) for details.

6 "Liquid assets" comprise the following flow-of-funds categories as published in the Quarterly Bulletin of the Bank: (10) Cash and demand monetary deposits, (11) Short/medium-term monetary deposits, (12) Long-term monetary deposits, (13) Deposits with other financial institutions. An adjustment was made for missing data on unincorporated businesses (see Aron and Muellbauer, 2006a).

The Bank publishes a quarterly analysis of bank deposits by type of depositor in its *Quarterly Bulletin*, but only from the third quarter of 1991⁵. Prior to the third quarter of 1991, in the absence of other data, the methodology in Aron and Muellbauer (2006a) was employed to cumulate the relevant flow-of-funds categories⁶ using a benchmark for the fourth quarter of 1969 and matching the third quarter of 1991 benchmark.

Other deposits

In the flow of funds, one further type of deposit is listed: 'Deposits with other institutions', such as households' deposits with municipalities. This is a very small category throughout the period. It was decided to group this category with directly held illiquid financial assets. The series is derived by cumulating the relevant flow-of-funds category (item 14) with respect to a benchmark for 1969, as in Aron and Muellbauer (2006a).

Interest in pension funds

Households' vested interest in pension funds comprises the accumulated funds of official as well as private self-administered pension and provident funds.

Data for both private and official pension funds are obtained from returns submitted to the Bank by the relevant institutions, and are published in the *Quarterly Bulletin*. However, in the case of private funds, data at market value became available only from March 1999, while data for official pension funds are still reported at book value. Book value data for both categories of pension funds were accordingly adjusted to market values employing the methodology in Aron and Muellbauer (2006a).

To derive the corresponding market values, the net holding gains by the end of the period on the market value of the stock at the beginning of the period have to be added, as well as any holding gains on net purchases made during the period. The revaluation adjustment can be explained as follows: Let A_{t-1} be the market value of an asset at the end of period $t-1$. Let π_{t-1} be the corresponding price index. Let NPA_t be net purchases of the asset during period t . Then

$$A_t = A_{t-1} (\pi_t / \pi_{t-1}) + (NPA_t)(\pi_t / \tilde{\pi}_t) \quad (1)$$

where $(\pi_t / \tilde{\pi}_t)$ is the revaluation adjustment of net purchases made in period t , and $\tilde{\pi}_t$ is the average price level recorded during the period of purchases, since it is assumed that purchases are spread over the period. Given an asset benchmark at an initial date, data on the net purchases in the period and the corresponding price indices, the revaluation adjustment in Equation (1) can be used to derive market-value data.

For private self-administered pension and provident funds, there are quarterly data on the portfolio composition of assets from 1963, and annual data from 1958, both on a book-value basis. There are seven groups of assets subject to revaluation. The adjustment of the book value of the assets to market value was made by applying Equation (1), and using end-1961 benchmarks and constructed price indices for each of the seven groups. Details on price index construction are provided in Aron and Muellbauer (2004, Appendix 2).

For official pension funds, which provide pension care for public-sector employees, there are annual book-value portfolio composition data from 1974. Prior to 1974, there

are annual data for total assets at book value, from 1948. These funds started investing in ordinary shares, other company securities and fixed property only in 1990, when quarterly data began. Prior to 1990, government, local authority and public-enterprise bonds accounted for more than 85 per cent of total assets purchased. To convert book to market values throughout the period, end-1961 benchmarks were employed with Equation (1) on quarterly interpolated data.

Interest in long-term insurers

Households' interest in long-term insurers is derived from the pension activities of long-term insurers. Around half the liabilities of long-term insurers represent personal-sector pension assets⁷. The pension business represents those activities of the long-term insurers conducted on behalf of the pension funds and the underwriting of annuities.

⁷ The non-pension business of long-term insurers, which is a conditional liability, is excluded because in this paper it was assumed that it did not contribute to personal-sector assets.

The data for unmatured policies of pension business by long-term insurers are directly surveyed from the relevant institutions by the Research Department of the Bank and published in the *Quarterly Bulletin*. However, as with the pension funds, the earlier data are reported at book rather than market value. The first reliable market-value data are reported from the fourth quarter of 1991. Consequently, data prior to this were adjusted to reflect market values using the methodology in Aron and Muellbauer (2006a).

Equities and other illiquid financial assets

Directly held illiquid financial securities are defined as the sum of households' holdings of all government and private bonds, deposits with participation mortgage bond schemes, equity and "other deposits" (i.e. longer-term deposits, see above).

Participation mortgage bond schemes are in some respects similar to unit trusts. A pool of funds of a large number of smaller lenders is constructed in order to finance large mortgage loans. The participation is similar to long-term deposits of five years or longer. Investors are largely households seeking high, yet secure returns on their capital. Deposits received from participants (individuals) are directly reported in the *Quarterly Bulletin* of the Bank.

In the absence of other data, the flow-of-funds data were used to construct measures of government and public enterprise stocks, using the methodology outlined in Aron and Muellbauer (2006). The government and public enterprise components of the flow of funds comprise short-term and long-term government stock, and the securities of local authorities and public enterprises.

The benchmarks for short-term and long-term government stocks come from data on the ownership of end-1969 stocks in *Public Finance Statistics* of the Bank; while quarterly figures on the personal-sector ownership of the securities of local authorities and public enterprises are available from 1970 in *Capital Market Statistics* of the Bank.

All these figures are on a book-value rather than on a current market-value basis, and require the revaluation adjustment using Equation (1). The methodology for estimating price indices for fixed-interest securities is described in Aron and Muellbauer (2004, Appendix 1)⁸.

⁸ Historical data on government bond price indices from the Johannesburg Stock Exchange (JSE) – and more recently from the JSE Securities Exchange – begin in 1980, while the Bank has published a bond price index only from 1999. Aron and Muellbauer (2004; 2006a) therefore use standard price-yield relationships to derive price indices for short and long-duration government bonds before 1980. Coupons and maturities are held fixed for quarter-to-quarter comparisons, and these indices are chained.

An accurate assessment of the direct investment in shares by households is one of the most difficult calculations to make, due to the lack of reliable information in South Africa.

The available data on ownership by the personal sector are unsatisfactory, since surveys of share registers and of household finances carried out in the US and UK are not carried out in South Africa. Limited data on share transactions are, however, available.

Thus, the stock of shares directly held by households for the whole period was estimated using the flow-of-funds data regarding ordinary shares held by households, from the methodology in Aron and Muellbauer (2006). The flow-of-funds categories were cumulated using a benchmark of the value of ordinary shares held by households in 1969, estimated from relevant ratios in the UK and US. Conversion from book to market value of stocks was carried out using the JSE all-share index, adjusted for assumed trading or management costs – see Aron and Muellbauer (2006a).

For ordinary shares, estimates are sensitive to the chosen benchmark for 1969. The assumptions made in this paper imply that households owned 41 per cent of the market capitalisation of the JSE at the end of 1969 and 18 per cent at the end of 1997 (see details in Aron and Muellbauer, 2006a).

2.2 Liabilities

On the liability side of the household-sector balance sheet, the two main components of debt are mortgage advances and other credit extended to households. The latter, sometimes referred to as “consumer credit” is, in turn, subdivided into open account credit, personal loans extended by banks, credit card facilities, instalment sale transactions and lease agreements, other personal loans and non-bank loans. Van der Walt and Prinsloo (1993) and Prinsloo (2002) published detailed charts of total household debt and its main components, and information on the institutional framework underpinning household debt and the data sources and methods used in its estimation.

The bulk of household debt is borrowings from the banking sector. Relevant data are obtained from monthly and quarterly returns to the Bank Supervision Department of the Bank, in compliance with section 90 of the Banks Act, 1990 (Act No. 94 of 1990).

3. Balance sheet estimates and trends in wealth

Real household spending has recorded brisk increases in recent years, and is partly explained by trends in the net wealth of the household sector (see Table 1). Although net wealth as a percentage of personal disposable income of households fell from an average level of 315 per cent in 1980 – 1998 to an average of 283 per cent for 1999 – 2003, preliminary estimates indicate that this ratio has increased again and in 2005 actually exceeded the high average levels reached during the 1980s and 1990s.

The recent strong growth in household wealth can mainly be attributed to substantial increases in asset prices, particularly in the private property and equity markets.

The fluctuations in the total net wealth (conventionally excluding consumer durables) of the household sector are shown in the graph on the facing page, relative to disposable income⁹ of households. The relatively high wealth-to-income ratio in the early 1970s, associated with strong economic growth and high gold price, declined in the mid-1970s as the world economy faltered and as domestic political difficulties increased.

The ratio rose following a large gold price boom around 1980, when buoyant share prices were followed by rising house price and investment booms. When economic and political difficulties increased in the 1980s, and the debt crisis of 1985 and international trade and financial sanctions severely constrained access to capital and trade, growth

⁹ In modelling household expenditure or portfolio decisions in the current quarter, one would normally use asset data at the end of the previous quarter, and current quarter personal disposable non-property income rather than the moving average of personal disposable income (PDI), see Aron and Muellbauer (2000a,b). However, PDI is more comparable internationally, while its non-property variant is subject to approximations of varying complexity; see Blinder and Deaton (1985).

Table 1 Balance sheet of the household sector for selected years

R billions

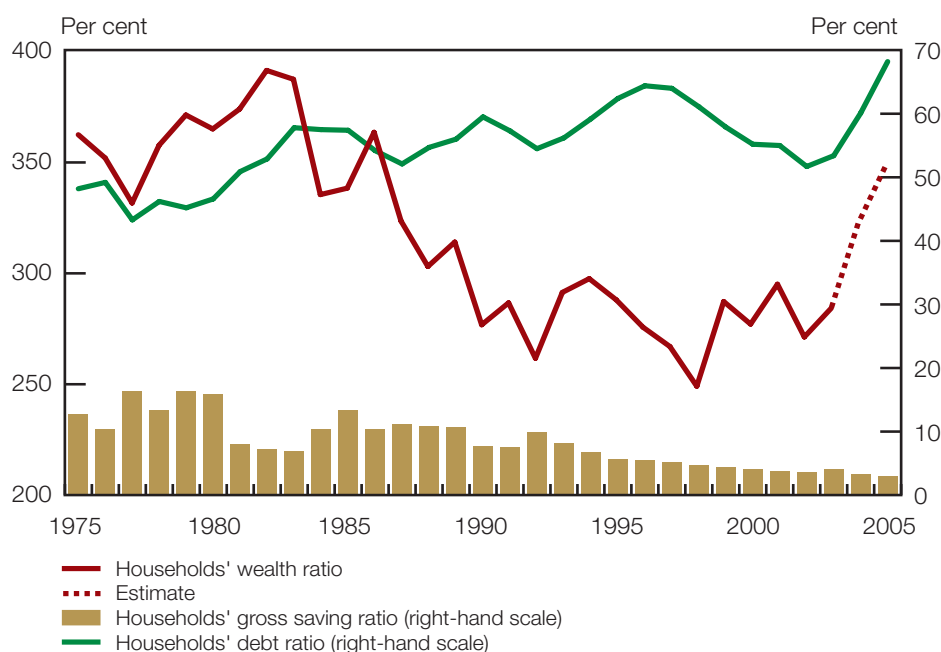
Year ended 31 December	1975	1980	1985	1990	1995	2000	2005*
Total assets	64,5	139,5	287,0	607,6	1 226,5	1 921,0	3 969,1
Tangible assets	35,9	65,3	123,7	219,4	315,5	504,2	1 225,0
Residential buildings	18,5	34,8	73,0	136,8	211,4	363,2	1 005,3
Other tangible assets.....	17,3	30,5	50,6	82,6	104,2	141,0	219,8
Financial assets.....	28,6	74,2	163,4	388,3	911,0	1 416,8	2 744,1
Liquid assets	15,4	30,4	60,5	97,3	152,4	296,4	686,3
Interest in pension fund and long-term insurers	8,7	25,8	70,9	200,2	537,0	851,4	1 420,1
Other assets	4,5	18,0	32,0	90,7	221,5	269,0	321,9
Total liabilities and net worth	64,5	139,5	287,0	607,6	1 226,5	1 921,0	3 969,1
Mortgage advances.....	4,5	8,9	19,0	50,6	119,4	176,9	398,3
Other credit.....	3,6	7,8	24,7	57,4	98,5	147,4	262,4
Net worth.....	56,4	122,8	243,3	499,6	1 008,6	1 596,6	3 308,4
Net worth including durable consumer goods (memo item)	61,9	132,7	264,3	543,6	1 094,8	1 742,7	3 579,6

Individual items may not add to totals due to rounding

* Preliminary estimates

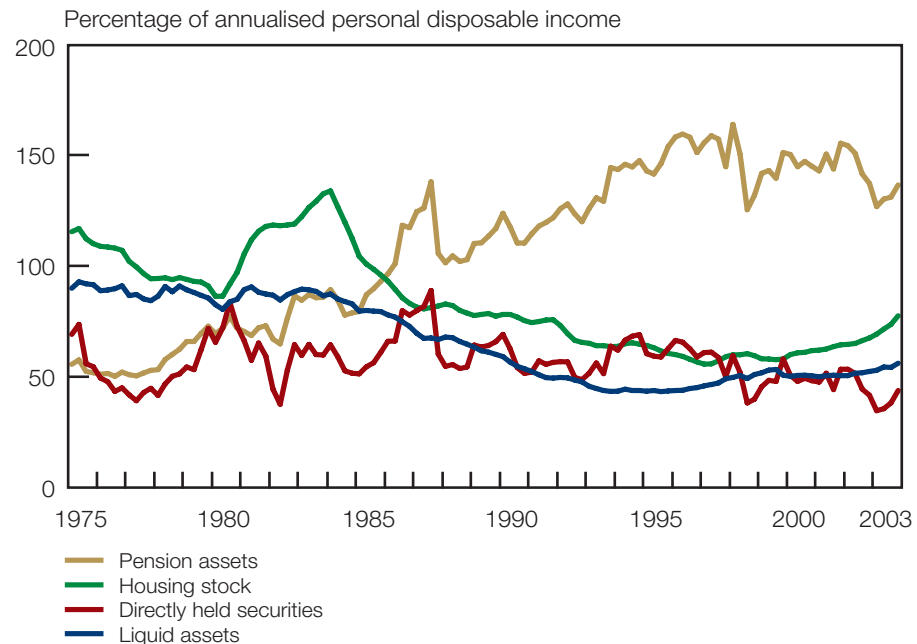
weakened and real house prices began a long-term decline. A gold price recovery in the late 1980s brought a temporary rise in the wealth-to-income ratio; but since 1988, the ratio has fluctuated in a relatively narrow range, despite the positive political changes in South Africa. However, current indicators suggest that a lower turning point in the wealth-to-income ratio was reached in 1998, as the increase in the market value of total assets outweighed the increase in household debt and disposable income during the period 1999 to 2005.

Households' saving, debt and net wealth as percentage of personal disposable income



However, the relative importance of the components of net wealth underlying these trends showed substantial changes over the past three decades. Most striking are the rise in the value of pension wealth, the downward trend in the value of directly-held securities relative to disposable income, the decline and recent recovery of housing wealth, the rise in household debt (see previous graph) and the concomitant decline of liquid assets from the early 1980s to the present. The other components as ratios to income are shown in the graph below.

Selected assets of the household sector

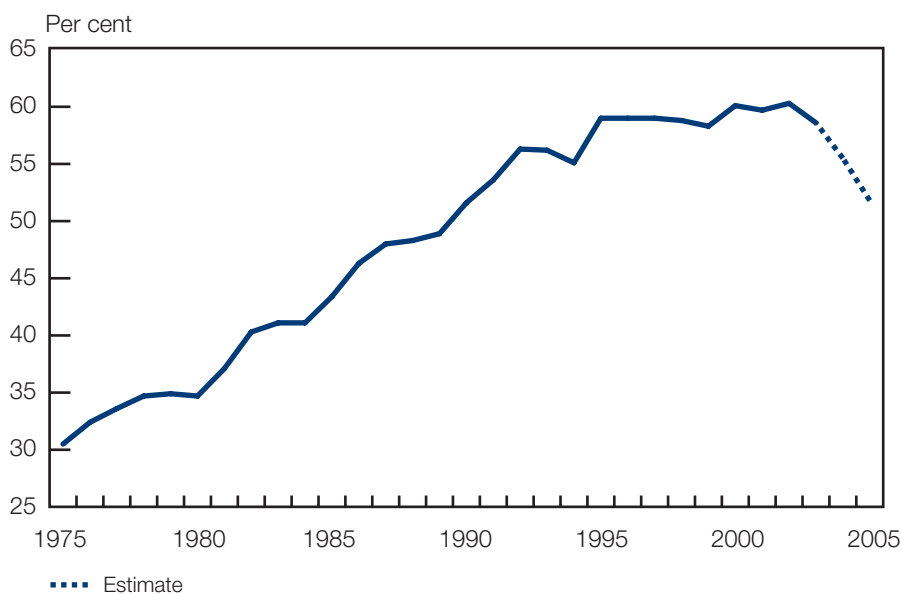


Households' interest in pension funds and long-term insurers relative to total financial assets rose from an average of 39 per cent in the beginning of the 1980s to an average of approximately 58 per cent between 2000 and 2005. By contrast, the share of total liquid assets in financial assets declined from about 42 per cent to 23 per cent over the corresponding period. For details on the role of comparative asset returns, taxation treatment and regulation on the trends in holdings of liquid assets, directly held assets and pension assets, see Aron, Muellbauer and Prinsloo (2006).

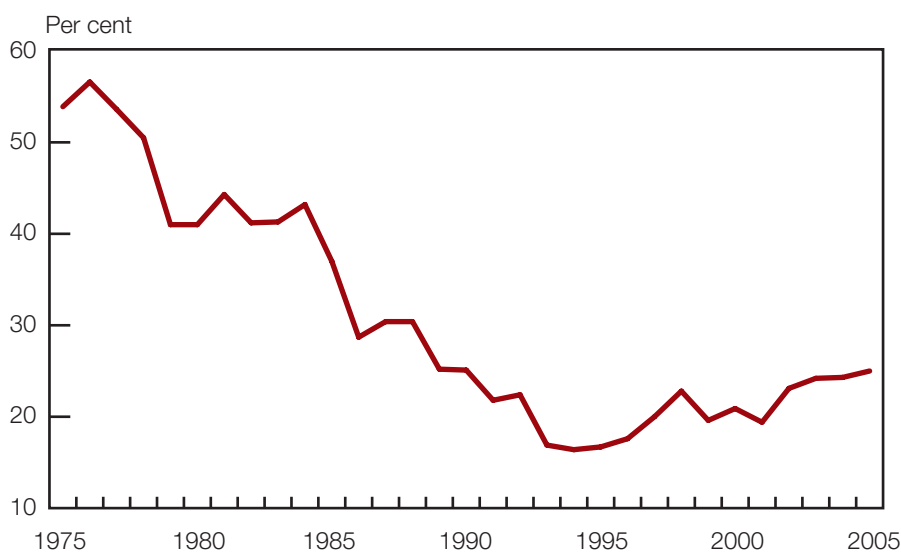
Most of the rise in the early 1980s and subsequent decline in the value of housing assets relative to income is due to the rise and then decline in the real house price index. Despite an increase at an average annual rate of 8 per cent between 1999 and 2003, the real value of houses at the end of 2003 still remained about 22 per cent below the peak in 1984. The subdued real rate of return over a long period on investment in fixed property seemed to have encouraged households to concentrate their saving in risk-averting institutions and financial assets rather than in riskier undertakings and fixed assets. However, from 2003 to the end of 2005, South Africa has seen exceptionally strong house price rises, alongside rising income, reductions in nominal interest rates, and buoyant consumer and business confidence.

In South Africa, as in many other countries, the increase in the household debt-to-income ratio over the past three decades can largely be attributed to three factors: The financial deregulation from the beginning of the 1980s; the reduction in interest rates, both in nominal and real terms; and the rise in wealth-to-income ratios.

Households' interest in pension and life insurance funds as percentage of total financial assets



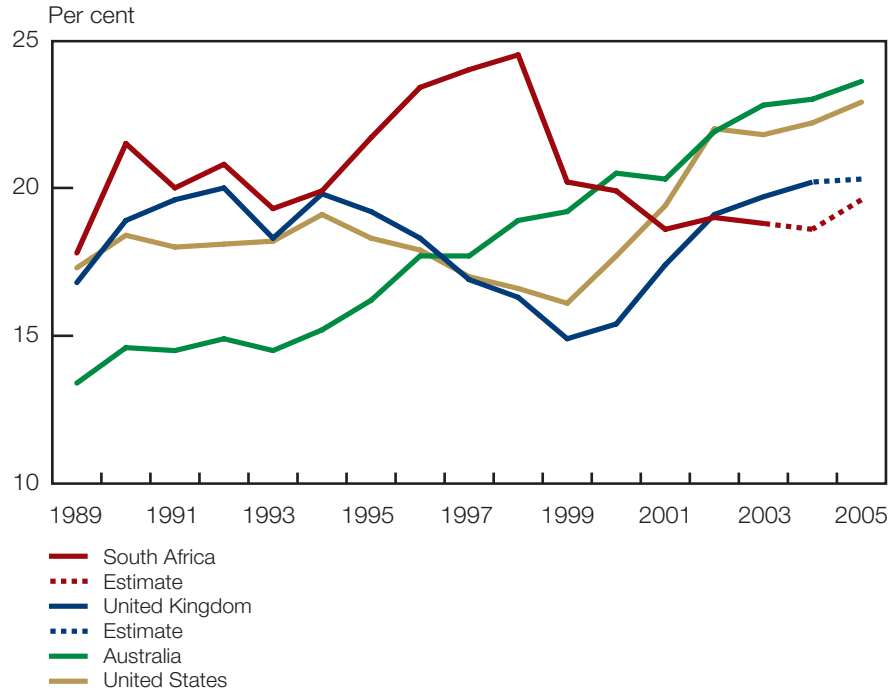
Households' liquid assets as percentage of total financial assets



An international comparison shows that although South Africa's ratio of household debt to disposable income increased strongly in the 1980s and again in the first half of the 1990s, it was lower than the corresponding ratios in most of the Organization for Economic Cooperation and Development (OECD) countries, and significantly lower than in the United States of America, Japan, Canada and the United Kingdom, where household debt recorded values well above 100 per cent of disposable income. However, household debt as a percentage of net wealth was relatively high in South Africa until the late 1990s. The moderation in South Africa's debt-to-net-wealth ratio since 1998 was the net result of a slowdown in the growth of household debt until 2002 and the subsequent acceleration in asset prices, particularly in residential housing during 2003 and 2004. In addition, households' net wealth received a further boost in 2005 on account of a surge in equity prices. However, the recent surge in the growth in

household debt was strong enough to result in a modest increase in the debt-to-net-wealth ratio of the household sector in 2005; this ratio would also obviously be vulnerable to any downward movements in asset prices.

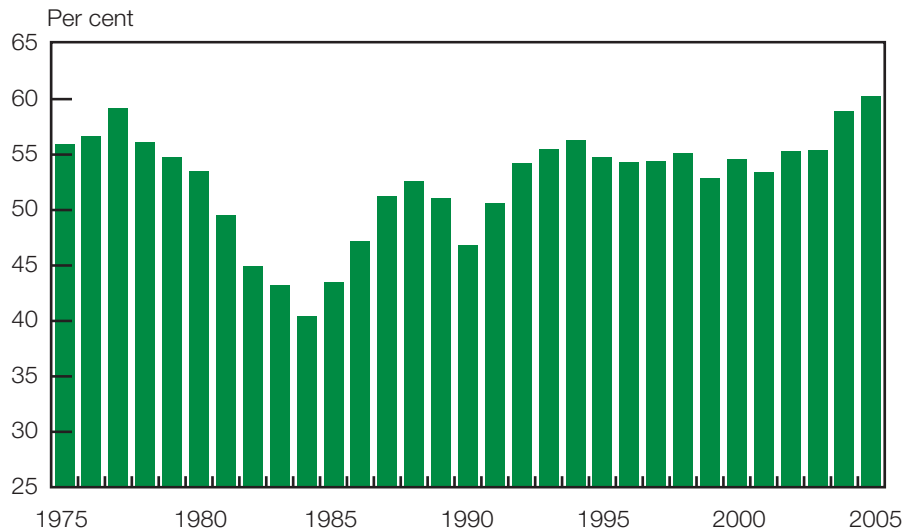
Households' debt as percentage of net worth



Source: Federal Reserve Statistical Release, Flow-of-Fund Accounts of the United States; Australian Bureau of Statistics, National Accounts; and Office of National Statistics, United Kingdom, National Accounts (various issues)

The composition of households' liabilities has changed significantly over time. For instance, the relative importance of mortgage debt fell in the early 1980s, while the ratio of consumer credit to total household debt increased to a high of 54 per cent in 1984. These developments were driven by the asset boom of the early 1980s, and the

Mortgage debt as percentage of total household debt



beginnings of financial deregulation. The government initiated financial liberalisation following the De Kock Commission reports (1978, 1985), which advocated a more market-oriented monetary policy (see Aron and Muellbauer, 2002). Interest and credit controls were removed in 1980, and banks' prescribed minimum liquidity ratios were reduced substantially between 1983 and 1985. However, the early deregulation affected consumer credit growth and not the mortgage market, which only caught up in the mid-1980s when competition rose in the mortgage market following the 1986 Building Societies Act, amendments to the Act in 1987 – 1988, and various innovations.

The share of mortgage debt in total debt remained relatively steady in the 1990s, but subsequently rose alongside the appreciation of housing wealth, the introduction of more flexible home loan products and the entry of numerous new first-time buyers to the housing market.

4. Concluding observations

There is universal recognition of the strategic importance of the household sector and the influence it has on consumption and saving in the economy. The availability of balance sheet data for the household sector can make a significant contribution to the effective assessment of households' consumption behaviour and provides valuable insights regarding the management of a country's national wealth.

While saving and borrowing flows provide a window on how the household sector is adjusting its balance sheet, the balance sheet itself – the stock position – adds significantly to the assessment of the economic outlook. From the balance sheet the magnitude and composition of household-sector wealth can be established and used in the analysis of consumer behaviour, such as household consumption expenditure as well as portfolio adjustments. With balance sheet data, a more comprehensive measure of income comprising consumption plus the change in net wealth can be calculated, thereby incorporating the effect of developments such as capital gains and extending the conventional national accounts analysis. Furthermore, the additional information may also help to improve the quality and analysis of existing national accounts statistics.

This study presents a brief review of the methodology used to construct the main balance sheet aggregates of the South African household sector in time series format. It also highlights a number of the most significant developments which may be observed in the balance sheet data, including the increase in the net wealth-to-income ratio from 1999, largely as a result of the buoyancy of asset markets. Incorporating wealth effects and balance sheet information in the analysis of consumer behaviour enhances the depth of such analysis, and is set to remain an important research topic internationally. It can now also be taken further with respect to South Africa (see recent estimates in Aron and Muellbauer, 2006b).

References

Aoki, K, Proudman, J and Vlieghe, G. 2002. Houses as Collateral: Has the Link between House Prices and Consumption in the U.K. Changed? *Economic Policy Review*, Vol. 8 No. 1: 163 – 177. Federal Reserve Bank of New York, May.

Aron, J and Muellbauer, J. 2000a. Personal and Corporate Saving in South Africa. *World Bank Economic Review*, Vol. 14, No. 3: 509-544.

- Aron, J and Muellbauer, J. 2000b. Financial Liberalisation, Consumption and Debt in South Africa. *Working Paper Series* 00.22. Centre for the Study of African Economies, Oxford University.
- Aron, J and Muellbauer, J. 2002. Estimating Monetary Policy Rules for South Africa, in Norman Loayze and Klaus Schmidt-Hebbel (eds) "Monetary Policy: Rules and Transmission Mechanisms", *Series on Central Banking, Analysis and Economic Policies*, Vol. 4: 427 – 475, Central Bank of Chile.
- Aron, J and Muellbauer, J. 2004. Estimates of Personal Sector Wealth for South Africa. *Working Paper Series* No. 4646, September. London: Centre for Economic Policy Research. Available [online]: <http://www.cepr.org>
- Aron, J and Muellbauer, J. 2006a. Estimates of Household Sector Wealth for South Africa, 1970 – 2003. *Review of Income and Wealth*, Vol. 52, No. 2: 285 – 308. International Association for Research in Income and Wealth, June.
- Aron, J and Muellbauer, J. 2006b. Housing Wealth, Credit Conditions and Consumption. Presented in *Research Department Seminar Series*, International Monetary Fund, Washington DC, 31 May 2006. Available [online]: <http://www.csae.ox.ac.uk/>, "The South African Macroeconomic Research Programme".
- Aron, J, Muellbauer, J and Prinsloo, J. 2006. Towards Official Balance Sheet Estimates for South Africa's Household Sector, from 1975 to 2003. *Working Paper*, Pretoria: South African Reserve Bank (forthcoming).
- Blinder, A S and Deaton, A. 1985. The Time Series Consumption Function Revisited. *The Brookings Papers on Economic Activity*, Vol. 2: 465-511.
- Boone, L, Girouard, N and Wanner, I. 2001. Financial Market Liberalisation, Wealth and Consumption. *OECD Economics Department Working Paper* 308.
- Catte, P, Girouard, N, Price, R and André, C. 2004. Housing markets, wealth and the business cycle. *OECD Economics Department Working Paper* 394.
- De Kock, G. 1978. Commission of Inquiry into the Monetary System and Monetary Policy in South Africa. *Interim Report*. Pretoria: Government Printer.
- De Kock, G. 1985. Commission of Inquiry into the Monetary System and Monetary Policy in South Africa. *Final Report*. Pretoria: Government Printer.
- OECD Statistics. 2004. National Accounts of OECD Countries. *Financial Accounts Flows*, Vol. 111A and *Financial Balance Sheets*, Vol. 111B.
- Prinsloo, J W. 2002. Household Debt, Wealth and Saving. *Quarterly Bulletin*, No. 226, December. Pretoria: South African Reserve Bank.
- Prinsloo, J W. 2000. The Saving Behaviour of the South African Economy. *Occasional Paper* No. 15, November. Pretoria: South African Reserve Bank.
- Van der Walt, B E and Prinsloo, J W. 1993. Consumer credit in South Africa. *Quarterly Bulletin*, No.189, September. Pretoria: South African Reserve Bank.