

**Douw Boshoff**

---

## **The impact of affordability on house price dynamics in South Africa**

*Peer reviewed*

### **Abstract**

Lately, the residential property market in South Africa has experienced much turbulence. Some perceived growth as a 'property bubble', while others considered it a healthy investment opportunity. This article considers the fundamental drive behind residential property demand and analyses the recent property cycle compared to the past. It also considers the effects of residential property demand on the construction industry.

The study investigates the variables that drive property demand and uses methods of statistical fit of historical macro-economic variables to apply to a South African context and to explain recent residential property activity.

Research found that residential property demand and subsequent market prices are to a large extent influenced by affordability, which is indicated by capitalising rent as part of disposable income with the prime lending rate of banks. Gross domestic product, as the main indicator of growth within the country, is the main driver of disposable income for households, and can subsequently be used to foresee growth and its effect on affordability and residential property values.

The article provides insight into the spending behaviour of households, and shows how that behaviour flows over into spending on housing, and the subsequent influence on residential property values.

Keywords: Residential property demand, residential property values, macro-economic property variables, real house prices

### **Abstrak**

Die residensiële eiendomsmark in Suid-Afrika het onlangs baie turbulensies ervaar. Baie het die groei beskou as 'n "eiendoms bubble", terwyl ander dit as 'n goeie beleggingsgeleentheid beskou het. Hierdie studie ondersoek die fundamentele dryfkrag van residensiële eiendomsvraag en analiseer die onlangse eiendomsiklus in vergelyking met die verlede.

Die studie ondersoek die veranderlikes wat eiendomsvraag daarstel en gebruik statistiese regressiemetodes om die invloed van makro-ekonomiese veranderlikes op die onlangse residensiële eiendomsmark te bepaal.

Navorsing het getoon dat residensiële eiendomsvraag en dienooreenkomstig die markpryse daarvan, grootliks beïnvloed word deur bekostigbaarheid, wat aangedui word deur huurbesteding te kapitaliseer deur die prima rentekoers van banke. Bruto binnelandse produk, wat as die vernaamste aanwyser van

---

Mr Douw G.B. Boshoff Lecturer University of Pretoria Lynnwood road Hillcrest Pretoria South Africa 0002. Phone: +2712 420 3781 email: <douw.boshoff@up.ac.za>

groeï in die land beskou word, is die vernaamste dryfkrag agter besteebare inkomste, en kan gebruik word vir vooruitskattings op groei en die gevolg daarvan op bekostigbaarheid en residensiële eiendomswaardes.

Die studie verskaf insig in die bestedingspatrone van huishoudings, en dui aan hoe die algemene besteding ook die besteding op behuising en gevolglik huispryse beïnvloed.

Sleutelwoorde: Residensiële eiendomsvraag, residensiële eiendomswaardes, makro-ekonomiese eiendomsveranderlikes, reële eiendomspryse

## **1. Introduction**

Lately, the residential property market in South Africa has experienced much turbulence. Since the early 2000s there have been excessive growth and demand phases for residential property, which are now followed by a perceived low demand in both the property and the construction sectors. This article attempts to analyse the spending behaviour of households and the way in which this impacts on residential property behaviour in light of the residential values.

## **2. Demand for property**

When considering macro-economic behaviour, with specific reference to housing, what immediately comes to mind is that house prices in the long term should follow inflation. This perception is based on the presumption that housing is the single largest expense in the basket of goods and services used to calculate the Consumer Price Index (CPI), forming 21.04% of the weight of the basket as per the 2008 weights (Statistics South Africa, 2009/1: 4). Figure 1 graphically shows the relationship between these two variables. It has been adapted from information obtained from ABSA and the South African Reserve Bank to show the information, using the year 2000 as base year.

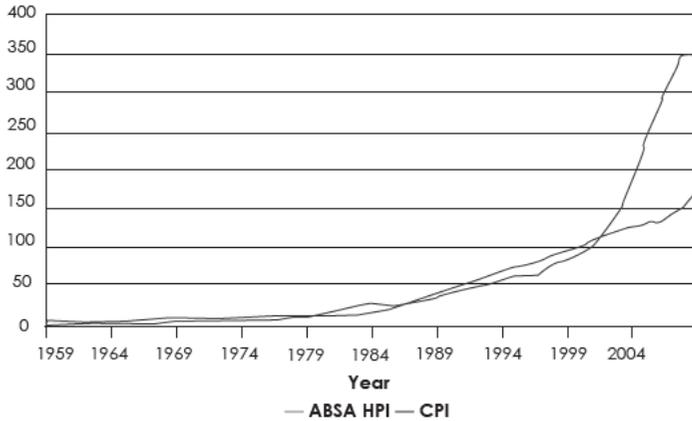


Figure 1: Comparison between CPI and property values  
 Source: Absa Retail Bank 2010: online South African Reserve Bank 2010a: online

Although it appears from Figure 1 that there was a fairly close correlation for many years, there are a number of periods during which the two indexes differed substantially. To consider this difference, the ABSA House Price Index is deflated by CPI in order to obtain the real property values as per ABSA. This is shown in Figure 2 with the year 2000 as base year. This also reveals that in real terms the recent past showed the highest growth in real property values for the data period under review.

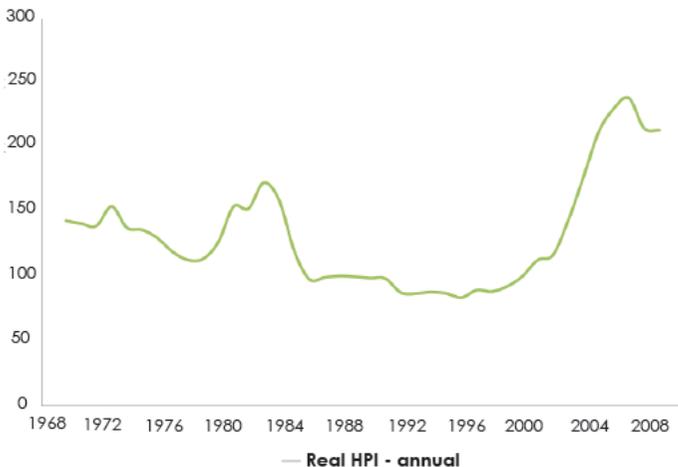


Figure 2: ABSA House Price Index deflated by CPI  
 Source: Absa Retail Bank 2010: online South African Reserve Bank 2010a: online

According to the ABSA data, property prices annually increased at approximately 30% for a number of consecutive years which, in light of a 6-8% inflation rate, could not be sustainable and must therefore be of a short-term nature.

The reasons for this rapid increase in house prices should, however, be explained in order to determine whether the market is overvalued and whether a decline in house prices could be expected, or whether there was a fundamental shift in house prices to correct a seemingly incorrect or changing equilibrium level.

Abraham & Hendershott (1996: 192) found that the determinants of real house price appreciation could be divided into two groups: those that account for changes in the equilibrium price level, and those that affect changes from the equilibrium price level. With the fluctuations in the real house price values (see Figure 2), it is suspected that there was a deviation from the equilibrium price level in the past few years. The question is: what is the equilibrium price level? If the values increased due to real demand and the correction of previous prices that were too low, it is reverting back to the equilibrium level. This should be weighed against the possibility of an overvaluation of property prices that were moving away from the equilibrium level. In answering the above, the real factors driving the demand for property, and subsequently the equilibrium price level, should be considered in order to assess whether the current price levels are in equilibrium, and if not, why, and by how much.

If one considers the deviations in real house prices (see Figure 2) as deviations from the equilibrium, it is assumed that a historical price level inflated by CPI is the equilibrium level, which should be tested if true.

In order to test this, the method for calculating the consumer price index should be considered. Prior to 2008, housing was included in the CPI basket as being either actual rent paid or, in the case of owner-occupied housing, interest rates on mortgages were taken as an indicator of cost of ownership (Statistics South Africa, 2008: 2). Bearing this in mind, it is expected that CPI itself is not directly linked to the value increases of residential property, as CPI is merely the reflection of the cost of living of households, while housing prices are a combination of various factors such as (but not limited to) opportunity cost of ownership rather than rent; demand and supply equilibrium levels, and cost of ownership, such as maintenance, interest rates, rates and taxes, and so on.

Capozza, Hendershott, Mack & Mayer (2002: 20) found that the variation in the cyclical behaviour of real house prices across metropolitan areas is due to more than merely variation in local economies. House prices react differently to economic shocks and depend on such factors as growth rates, area size, and construction costs.

According to Ortalo-Magné & Rady (2006: 4), the ability of young households to afford the down payment on a starter home, and in particular their income, is a powerful driver of the housing market. Haurin, Hendershott & Kim (1993: 284) confirm this, stating that independent living and household formation, which would increase the aggregate demand for housing, is to a large extent influenced by an individual's ability to pay this cost. They therefore suggests that affordability is a major driver of housing demand. Égert & Mihaljek (2007: 17) furthered this view, mentioning that house prices have a strong positive relationship with per capita Gross Domestic Product (GDP), real interest rates and real wages.

The above strongly indicate that house prices are influenced by affordability. In order to test for affordability, disposable income must be considered. Figure 3 shows the per capita real disposable income of households since 1970, with 2000 as the base year. It is evident that income has been fairly stable since the early 1970s through the 1980s and 1990s. This period was followed by substantial increases in income during the 2000s.

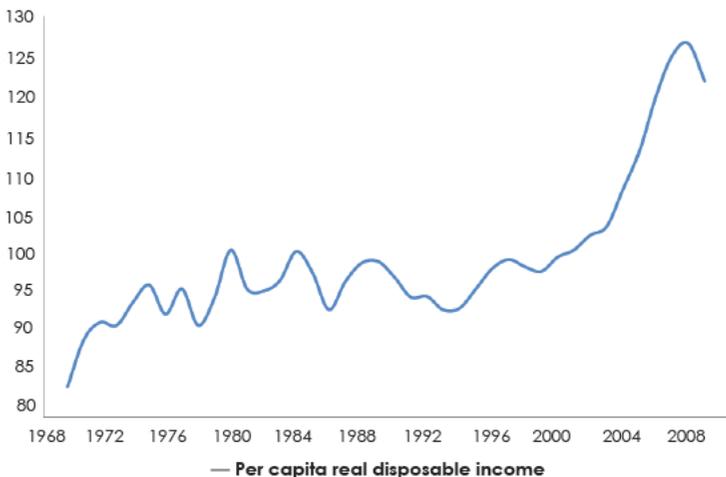


Figure 3: Per capita real disposable income  
Source: South African Reserve Bank 2010a: online

Mohr (2008: 33) indicates that the GDP is an indispensable indicator of economic performance. According to the income approach, compensation of employees forms part of the calculation of the total GDP of a country in a given period (Case & Fair, 1999: 141), and is also explained by the University of Pretoria (2010: 39) and the South African Reserve Bank (2010b: S104) as follows:

- **Expenditure on gross domestic product (at market prices)**
- **Plus:** Primary income from the rest of the world
- **Less:** Primary income to the rest of the world
- **Gross national income (at market prices)**
- **Plus:** Net current transfers from the rest of the world
- **Less:** Residual item
- **Gross national disposable income (at market prices)**

Figure 4 shows this relationship between gross domestic product, gross national income and disposable income. All three are shown per capita at constant 2005 prices.

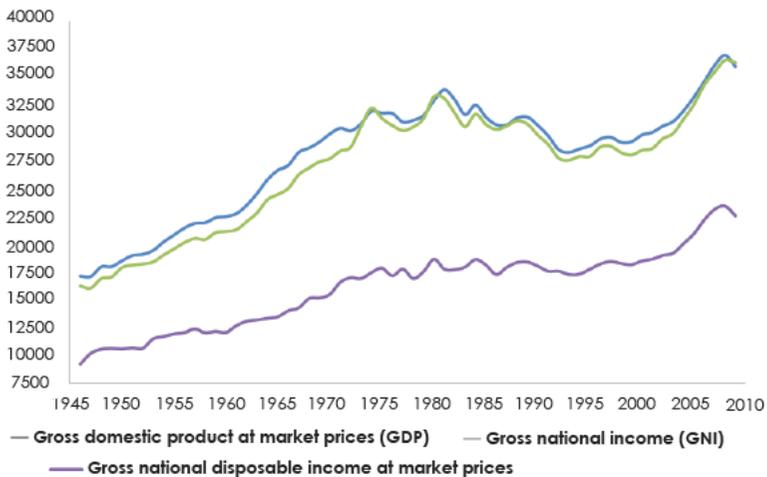


Figure 4: Comparison between GDP, GNI and disposable income  
Source: South African Reserve Bank, 2010a: online

It is clear from Figure 4 that the movements in real per capita disposable income were a result of increases in economic growth or growth in GDP in the country. The correlation of real per capita disposable income to real per capita GDP and real per capita GNI is 0.950 and 0.958, respectively – both significant at the 0.01 level.

The long-term trends in these figures could probably be explained by the political history of the country, but this is beyond the scope of this research.

Figure 2 showed the real house price index and Figure 3 showed the per capita real disposable income. The two are combined in Figure 5.

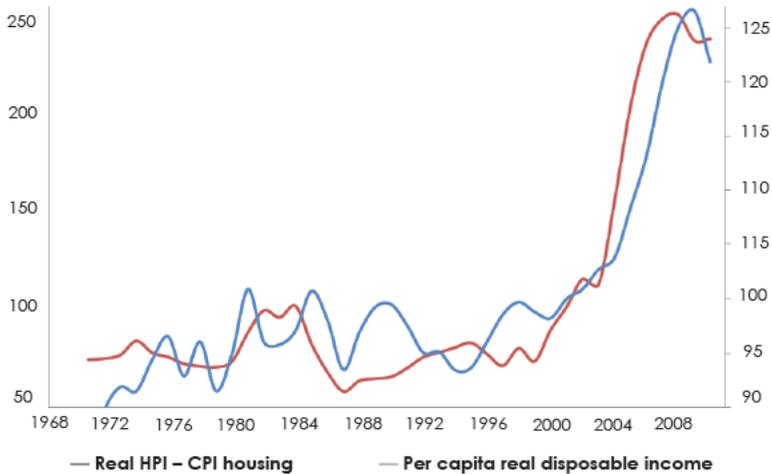


Figure 5: Comparison between per capita real disposable income and real HPI  
Source: South African Reserve Bank 2010a: online

The two indexes seem to move very well together, as if it could be stated conclusively that house prices are directly influenced by disposable income. The problem is, however, that the two are shown on a different scale. If the indexes were shown on the same scale, as in Figure 6, the facts are not so conclusive.

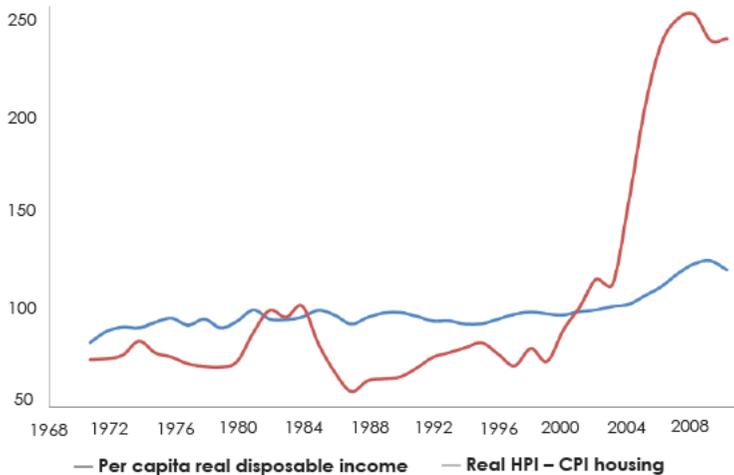


Figure 6: Comparison between per capita real disposable income and real HPI  
 Source: South African Reserve Bank 2010a: online

Although Figure 5 revealed that disposable income did increase substantially, the volatility and increase in house prices were much higher than with disposable income. It therefore appears that there is a multiplier in the disposable income that affects the house prices, confirming the findings of Lamont & Stein (1999: 498).

As mentioned earlier, various studies noted that house prices are influenced by affordability. Disposable income is the total money at the disposal of households to pay expenses. This, however, includes not only housing, but also various other expenses. The spending patterns of households are monitored by the central statistical service in order to determine the consumer price index (CPI). An analysis of the CPI over time could therefore provide valuable information on the aggregate expenditure of households, although very little actual correlation with house prices is observed.

When one considers CPI and disposable income, one needs to take cognisance of the total income at disposal (disposable income), actual expenditure that took place (final consumption expenditure), and the cost of goods purchased. For any given level of income, a certain number of goods and services is consumed. The change in price of these goods and services (consumer price index) will result in a choice of how much to consume of each item, and the

combination of goods and services to be consumed might change over time.

### 3. Consumption behaviour of households

The actual consumption expenditure represents the demand for goods, given the available supply. If the demand for goods and services increases, but there is no increase in the supply, the cost of the goods and services will increase. This applies to the aggregate of goods and services as well as to individual goods and services, which influence the choice between alternatives.

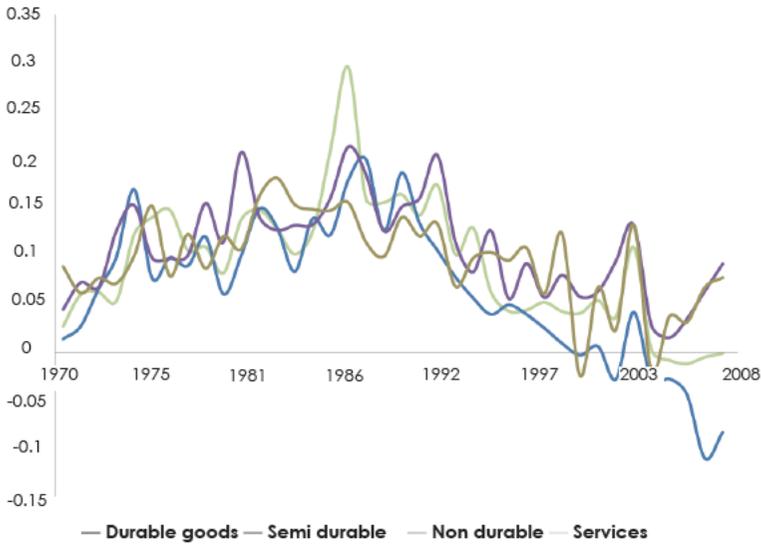


Figure 7: Year-on-year change of contributors to CPI  
Source: Statistics South Africa 2010: online

Figure 7 shows the year-on-year changes for different items that make up the basket for CPI. If consumption expenditure is broken down into the same four categories, the expenditure on each of these items, as a percentage of total consumption expenditure, could give an indication of households' preferences of the different items over time. Figure 8 shows the figures from 1970.

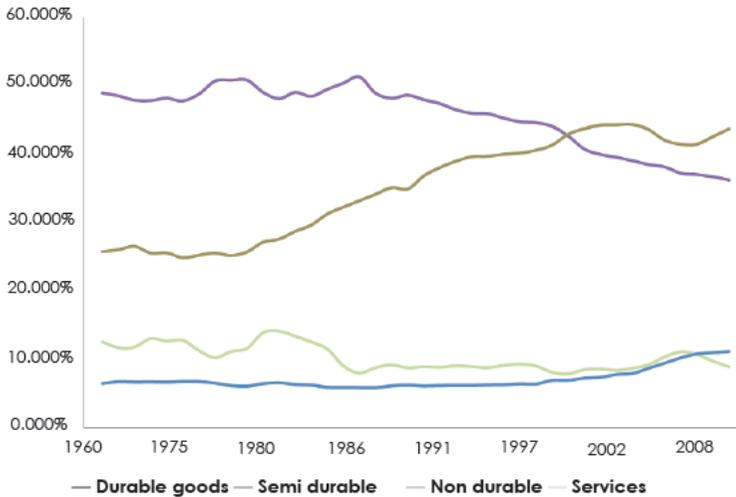


Figure 8: Consumption expenditure by households on different items  
 Source: South African Reserve Bank 2010a: online

If these percentages are correlated to the CPI changes in Figure 7, it could give some insight into the spending patterns of households, as in Figure 9.

From Figure 9 it is evident that durable goods such as furniture, cars, and so on remain at a level from approximately 8% to 14% of total expenditure, irrespective of the movement of the cost of these goods as reflected by the CPI figure for this category of items. The correlation of 0.027 might indicate that households are indifferent to the cost of the goods in deciding whether to buy them or not. The nature of the goods is such that they are not consumed, but last a very long time, with the result that households would therefore probably buy these goods as they are needed, and are not so much influenced by price increases.

Semi-durable goods such as clothing have a negative correlation of 0.319 to the price increases of the items, indicating that households are shifting their spending preferences towards other goods as these goods are increasing in price. This indicates that these are not so important, and that it is possible not to spend on them if prices are increasing.

Non-durable goods include consumables such as food and other household consumables, and have a correlation to the consumption

expenditure of these items of 0.480. This indicates that households consider these goods as necessary expenses and would buy the same quantity of goods even if the prices increase. The quantity that remains the same therefore indicates that the total consumption increases due to the increase in price, with a subsequent higher spending in relation to other items in the total basket.

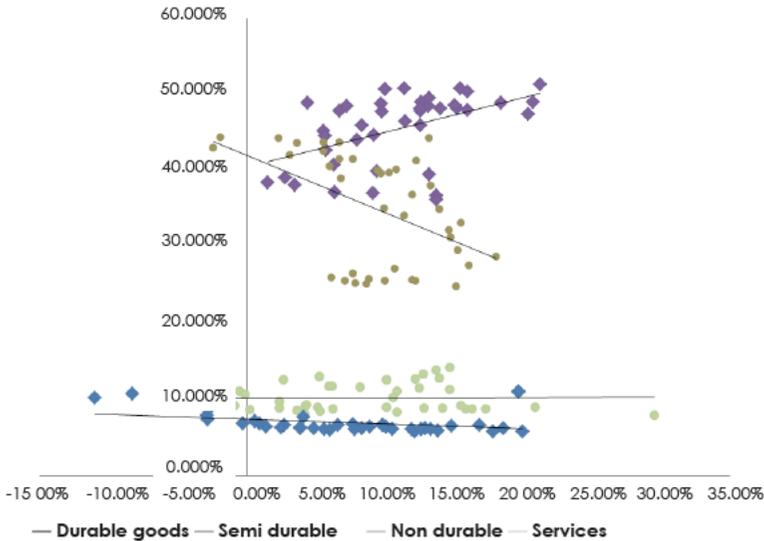


Figure 9: Correlation of consumption to price increases of various items  
Source: South African Reserve Bank 2010a: online

Services have a negative correlation of 0.482, indicating that households are shifting away from these goods as the prices are increasing. The negative correlation is even higher than semi-durable goods, indicating that households are more sensitive to price changes in services than they are to the other expenses.

#### 4. Consumption expenditure by households – property

Housing expenditure in the form of rent or imputed rent for owner-occupiers is recorded under services. As stated earlier, the CPI figure for housing until the end of 2008 was recorded as the cost of financing, but was changed to be in line with international standards to measure rent and owner-equivalent rent (Statistics South Africa, 2009/2: 2).

Tsatsaronis & Zhu (2004: 65) mention that due to the requirement of external financing in house purchases, the cost and conditions of mortgage credit play a major role in house price dynamics. One should therefore look beyond disposable income to explain the affordability of housing.

Mishkin (1995: 4) and Mishkin (1996: 2) showed that the traditional Keynesian ISLM view of the monetary transmission mechanism also applies to consumer spending in which *I* represents *inter alia* residential housing. In addition, they indicate that monetary expansion also operates through the land and housing price channels as well as wealth effects, of which the increase in house prices forms part. They state that an increase in interest rates causes deterioration in household balance sheets, because consumers' cash flow is adversely affected.

Bosworth, Hendershott & Jaffee (1980: 444) comment that the sudden rise and magnitude of mortgage rates caused an increase in the cost of home ownership, resulting in a decline in the demand for owner-occupied housing.

The above studies indicate that interest rates must also be considered in order to explain affordability.

Figure 10 shows the prime lending rate of banks, while Figure 11 shows the comparison between CPI (housing) and the prime lending rate of banks. It is evident from Figure 11 that there is some long-term similar directional movement, which only becomes apparent with a moving average of more than six years. Figure 12 shows this correlation between the two rates more clearly, where a correlation of 0.336 is evident.

As mentioned, the CPI housing calculation was changed from January 2009 to represent the increase in rent or imputed rent. As this information was not available prior to 2008, a similar rate was deduced, taking the household consumption for rent at current prices and dividing it by the same figures, but at constant 2005 prices. This provides the relationship between current and constant prices, representing a deduced CPI figure for rent. The result is shown in Figure 13, with a comparison to the CPI (housing) rate.

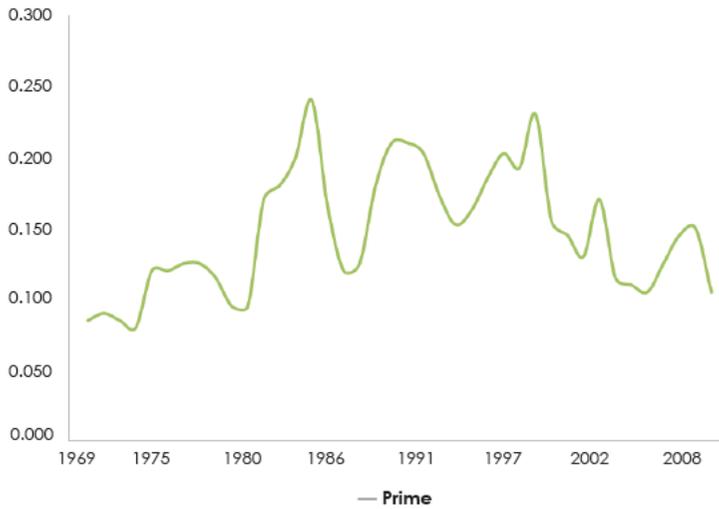


Figure 10: Prime lending rate of banks  
Source: South African Reserve Bank 2010a: online

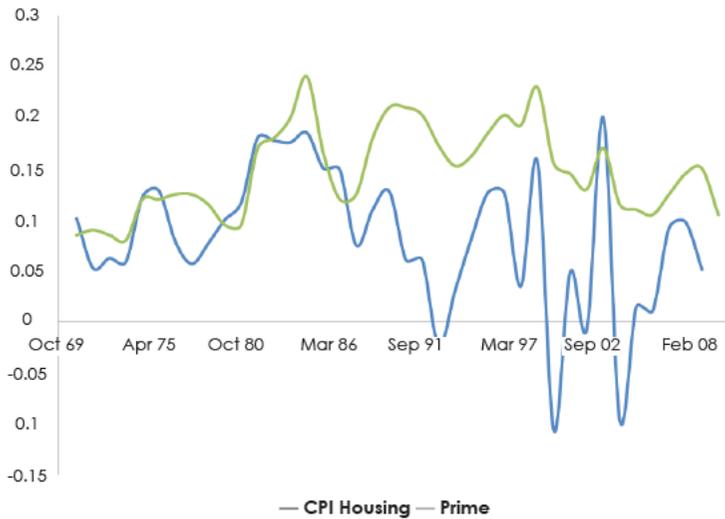


Figure 11: Comparison between prime lending rate and the CPI (housing) rate  
Source: South African Reserve Bank 2010a: online Statistics South Africa 2010: online

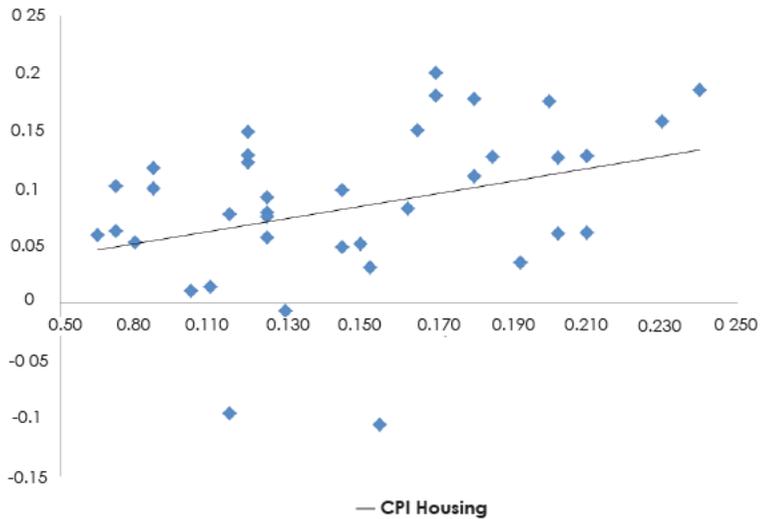


Figure 12: Correlation between prime lending rate and the CPI (housing) rate  
 Source: South African Reserve Bank 2010a: online



Figure 13: Comparison between CPI (rent) and the CPI (housing) rate  
 Source: South African Reserve Bank 2010a: online

In Figure 14 the consumption expenditure, as a percentage of total consumption, is compared to the change in rent prices per year, while Figure 14 shows the correlation between the rates.

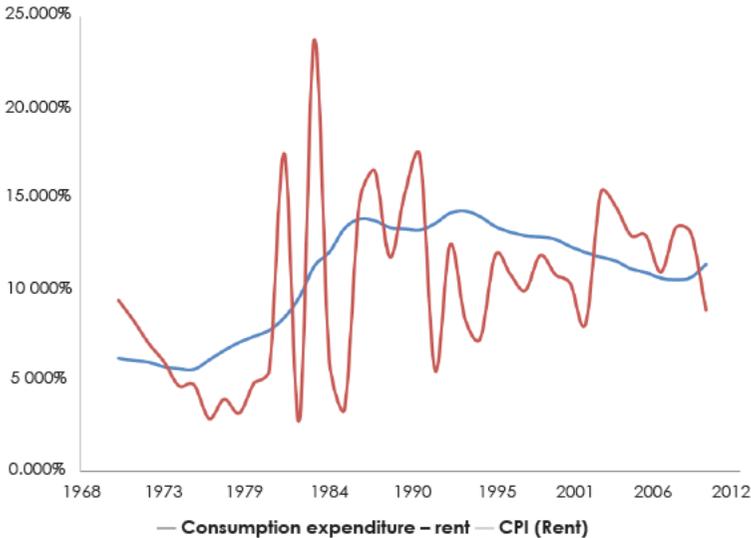


Figure 14: Comparison between CPI (rent) and consumption expenditure on rent  
 Source: South African Reserve Bank 2010a: online

It is obvious that, although CPI (rent) is much more volatile than the actual consumption, there is a fairly positive correlation of 0.466 between the total consumption expenditure on rent and the price increases thereof. This is in line with the finding on non-durable goods, indicating that households also consider rent as a necessary expense, and not a luxury expense such as semi-durable goods or services other than rent. However, this partly contradicts the findings of Mishkin (1996: 2) that households view durable goods as an investment motive, similar to housing expenditure. This could, however, explain why households are indifferent to the price of durable goods, and not sensitive to the price of the goods, but the cost of financing may play a role. This, however, is beyond the scope of this study.

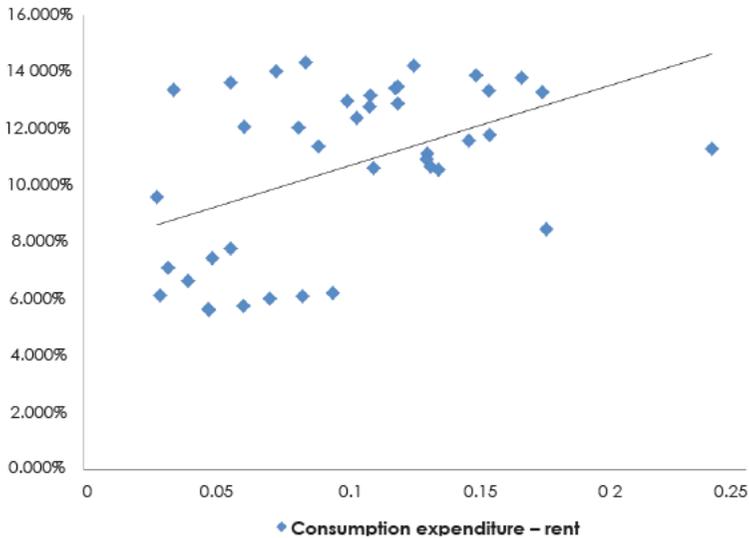


Figure 15: Correlation between CPI (rent) and consumption expenditure on rent  
Source: South African Reserve Bank 2010a: online

In addition, the consumption expenditure of housing is measured as either rent or imputed rent for owner-occupiers, but in reality the owner's expenditure on housing is the purchase price of the house.

*There are essentially two types of arrangements that characterise the housing market: housing is either lived in by the owner of the property or rented out by a landlord (owner) to a tenant (Statistics South Africa, 2008: 2).*

This indicates that if an owner does not occupy his property him-/herself, s/he has the opportunity to generate an income by letting it. The rent that is foregone due to his/her personal occupation of the house is therefore an opportunity cost of occupation. A differentiation is therefore made between the investment motive of the owner, and the use motive. Alternatively, the owner could choose to invest in an alternative investment, not a house, and pay rent in order to have the use of a house. The cost of rent would therefore be weighed against the cost of ownership, with all the advantages and disadvantages attached to each, to decide which alternative would realise the highest benefit.

There are therefore two aspects of house purchase – a use aspect and an investment or wealth aspect. The latter is not taken into

consideration when calculating official consumption expenditure figures. House prices are therefore affected by:

- the cost for the use of housing space in relation to the cost of alternative goods and services that need to be purchased with limited income, and
- the investment return that could be obtained if a house is purchased and rented out, or purchased instead of rented.

The above indicates that households view the expense on rent or imputed rent as a necessary expense, and would rather pay the extra price of rent when prices increase, and sacrifice the consumption of other goods or services. This is probably due to a number of factors, which could include the following (Green & Hendershott, 1999: 1-12; Stein, 1993: 379-406):

- households appreciate the importance of a place to stay;
- the effort involved in moving;
- cost involved in moving, and
- in the case of the investment motive, in most cases housing is the single largest investment by individual households to be made during their lifetime.

Bosworth *et al.* (1980: 444) noted that a dominant determinant of housing cycles was the availability of funds from mortgage-financing institutions, as well as the activity of federally sponsored credit agencies. Haurin, Hendershott & Wachter (1997: 137, 138, 149) found that borrowing constraints significantly reduce the tendency towards home ownership, while Mishkin (2007: 5) indicated that the housing market and, in turn, the overall economy, are directly or indirectly affected by monetary policy via the following six channels:

- user cost of capital;
- expectations of future house-price movements;
- housing supply;
- standard wealth effects from house prices;
- balance sheet, credit-channel effects on consumer spending, and
- balance sheet, credit channel effects on housing demand.

If it is accepted that households do not purchase certain goods such as houses in cash, but rather finance it, it would mean that the total amount that households are prepared to spend on housing, represented here by the total consumption expenditure on rent,

should suffice to service the interest on the debt to which they commit themselves, and not the full debt amount.

If one considers the situation and assumes that the amount of consumption expenditure on rent could be used for interest payment, the total value of debt that could be serviced by the rent could be calculated by taking into consideration the cost of debt. On average this is taken as the prime lending rate of banks, as shown in Figure 10.

If this rate is taken as the average cost of lending, the total affordable value is the amount of interest that can be serviced from rent. The following function explains this:

$$\text{Interest payment} = \text{Loan Amount} \times \text{Interest Rate} \quad 1$$

This holds that for a given loan amount, an increase in the interest rate would result in an increase in the interest payment per period. If the function is re-written, the following could apply:

$$\text{Loan Amount} = \frac{\text{Interest payment}}{\text{Interest Rate}} \quad 2$$

This indicates that should the available amount for interest payment be divided by the going interest rate, it is possible to calculate the total amount that could be borrowed of which the interest could be serviced from the available amount set aside for interest payment.

From function 2 above, it therefore holds that for a given affordable payment, the amount of borrowed capital that can be afforded would vary for any change in interest rate. Figure 16 shows the total affordable debt if the real per capita consumption expenditure of households on rent is discounted by the prime rate of banks. This is then also compared to the house price index, deflated by the CPI (rent) index.

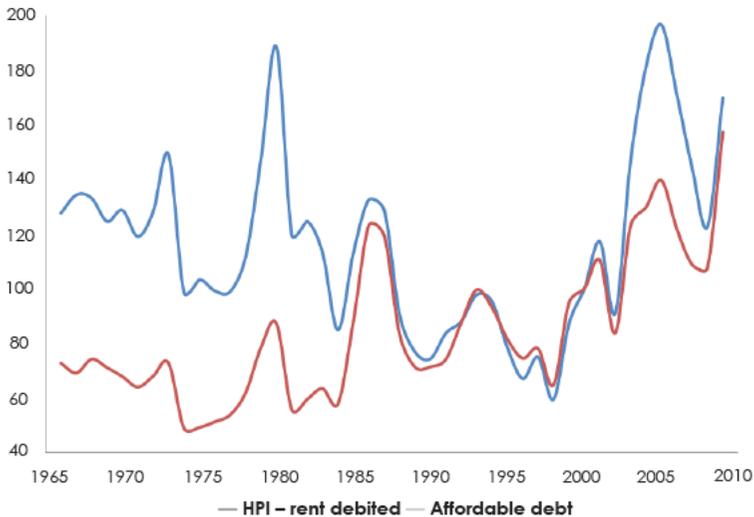


Figure 16: Comparison between HPI and affordable debt

Source: South African Reserve Bank 2010a: online Statistics South Africa 2010: online

Although there are some deviations, especially prior to the early 1980s, there is a visible correlation between the two datasets. The correlation obtained is 0.548 for the time shown, while it increases to 0.913 for the period from 1984 onwards. This proves to be a good indication that rent discounted by interest rates serves as an accurate proxy for residential property values. Kearl & Mishkin (1977: 1572) found that past monetary policy will have affected the cost and availability of credit, and thereby the size of consumers' debt holding and subsequent housing demand. This might explain the deviations in some periods mentioned, but would need further investigation.

The phenomenon that prices still increase even though affordability slowed down or stopped, as observed during the latter half of the 2000 decade, could be due to investment literature of a motivational nature rather than informative technical details on investment principles. Haurin, Hendershott & Wachter (1996: 54) indicated that household wealth is a leading indicator of home ownership. This means that the total wealth or balance sheet growth of households is also a motivator for an increased demand in housing (Mishkin,

2001: 5-6). Although not directly related to housing, Mishkin (1978: 918-937) also studied the link between balance sheet movements and aggregate demand. With the high increases in real estate prices, home owners experienced rapid increases in their balance sheets, which created a feeling of increased wealth and subsequent demand for housing – be it an upgrade on existing owner-occupied housing, purchasing a second house as holiday accommodation, or purchasing for investment purposes. This caused an ongoing increase in demand, well past the point where affordability already assumed a negative direction. This could also be explained by the same principles that are studied under behavioural finance, where the irrational behaviour of investors and the momentum of markets are considered when buying and selling shares (Shiller, 2003: 83-104).

## **5. Summary**

From the above it can be determined that GDP, as a primary indicator of economic growth, also plays a large role in the determination of disposable income and the subsequent spending behaviour of households. From this it is, however, possible to predict the spending on rent if the price increases of alternative goods included in the basket of items are considered. Interest rates then also form a big part of households' decision on how much they are prepared to pay for houses as an investment medium, which is the primary driver of house prices.

It is clear that factors influencing the general economy, including international events, spill over to households, and are ultimately reflected in house prices, as well as the investment return that could be obtained.

## **6. Recommendations for further research**

This article primarily considered the demand aspect of residential property, and assumed equilibrium by considering actual consumption expenditure. The long-term effects of supply should also be taken into consideration, as noted by Archour-Fischer (1999: 33-43) in the FDW-model, the impact of property values on construction volume, and the subsequent change in stock levels which, in turn, affects the demand and supply equilibrium of space.

It is also recommended that this study be performed on other countries and markets in Africa and elsewhere to review its

applicability to those markets in an attempt to answer the intricacies of property and construction behaviour elsewhere.

## References

Abraham, J.M. & Hendershott, P.H. 1996. Bubbles in metropolitan housing markets. *Journal of Housing Research*, 7(2), pp. 191-207.

Absa Retail Bank. 2010. ABSA House Price Index. Unpublished raw data. Jan 1966 to Jun 2010. Online interactive data Data sets: KBP7032N; KBP6272Y; KBP6270Y; KBP6271Y; KBP6272Y; KBP6050Y; KBP6055Y; KBP6061Y; KBP6068Y; KBP1403M; KBP1403M; KBP6069Y. (Du Toit, J. Sectoral Analyst: Secured Lending). [Online]. Available from: <<http://www.resbank.co.za/qbquery/timeseriesquery.aspx>> [Accessed: July to October 2010].

Archour-Fischer, D. 1999. An integrated property market model: A pedagogical tool. *Journal of Real Estate Practice and Education*, 2(1) pp. 33-43.

Bosworth, B.P., Hendershott, P.H. & Jaffee, D.M. 1980. Real user cost and the demand for single-family housing. *Brookings Papers on Economic Activity*, 2, pp. 401-452.

Capozza, D.R., Hendershott, P.H., Mack, C. & Mayer C.J. 2002. *Determinants of real house price dynamics*. NBER working paper series, Working paper 9262, October.

Case, K.E. & Fair, R.C. 1999. *Principles of macro-economics*. 5<sup>th</sup> ed. New Jersey: Prentice-Hall.

Égert, B. & Mihaljek, D. 2007. *Determinants of house prices in central and eastern Europe*. CESifo Working Paper Series, Paper 2152, November.

Green, R.K. & Hendershott, P.H. 1999. Home ownership and unemployment in the U.S. Unpublished study funded by the National Multi Housing Council.

Haurin, D.R., Hendershott, P.H. & Kim, D. 1993. The impact of real rents and wages on household formation. *The Review of Economics and Statistics*, 75(2), pp. 284-293.

Haurin, D.R., Hendershott, P.H. & Wachter, S.M. 1996. Wealth accumulation and housing choices of young households: An exploratory investigation. *Journal of Housing Research*, 7(1) pp. 33-57.

- Haurin, D.R., Hendershott, P.H. & Wachter, S.M. 1997. Borrowing constraints and the tenure choice of young households. *Journal of Housing Research*, 8(2), pp. 137-154.
- Kearl, J.R. & Mishkin, F.S. 1977. The demand for residential housing and monetary policy. *Journal of Finance*, 5, pp. 1571-1586.
- Lamont, O. & Stein, J.C. 1999. Leverage and house-price dynamics in U.S. cities. *The Rand Journal of Economics*, 30(3), pp. 498-514.
- Mishkin, F.S. 1978. The household balance sheet and the great depression. *Journal of Economic History*, 38(4), pp. 918-937.
- Mishkin, F.S. 1995. Symposium on the monetary transmission mechanism. *Journal of Economic Perspectives*, 9(4), pp. 3-10.
- Mishkin, F.S. 1996. The channels of monetary transmission: Lessons for monetary policy. NBER Working Paper Series, Working paper 5464. National Bureau of Economic Research, Inc.
- Mishkin, F.S. 2001. The transmission mechanism and the role of asset prices in monetary policy. NBER Working Paper Series, Working paper 8617. National Bureau of Economic Research, Inc.
- Mishkin, F.S. 2007. Housing and the monetary transmission mechanism. Finance and Economics Discussion Series Working Paper: A speech at the Federal Reserve Bank of Kansas City's Economic Symposium, Jackson Hole, Wyoming. Board of Governors of the Federal Reserve System (U.S.), August.
- Mohr, P. 2008. *Economic indicators*. 3<sup>rd</sup> ed. Pretoria: Unisa Press.
- Ortalo-Magné, F. & Rady, S. 2006. Housing market dynamics: On the contribution of income shocks and credit constraint. *Review of Economic Studies*, 73(2), pp. 459-485, February.
- Shiller, R.J. 2003. From efficient markets theory to behavioural finance. *Journal of Economic Perspectives*, 17(1), pp. 83-104.
- Stein, J. 1993. Prices and trading volume in the housing market: A model with downpayment effects. *Quarterly Journal of Economics*, 110(2), pp. 379-406, May.
- South African Reserve Bank. 2010a. [Online]. Available from: <<http://www.reservebank.co.za>> [Accessed: January-October 2010].
- South African Reserve Bank. 2010b. *Quarterly Bulletin*, no. 256, June.
- Statistics South Africa. 2008. Rent in the South African CPI: Concepts and trends.

Statistics South Africa. 2009/1. Statistical release P0141.5 Consumer Price Index (CPI) 2008 Weights.

Statistics South Africa. 2009/2. The South African CPI Sources and Methods Manual.

Statistics South Africa. 2010. Online interactive data Consumer Price Index (Base 2000=100). [Online]. Available from: <[http://www.statssa.gov.za/timeseriesdata/excel\\_format.asp](http://www.statssa.gov.za/timeseriesdata/excel_format.asp)> [Accessed July to October 2010].

Tsatsaronis, K. & Zhu, H. 2004. What drives housing price dynamics: Cross-country evidence. *BIS Quarterly Review*, pp. 65-78, March.

University of Pretoria. 2010. Economics 320: Unpublished lecturing notes.